FLIGHT

and The AIRCRAFT ENGINEER

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The Outlook

A Peak Week

THE bombing side of the war reached a certain degree of intensity last week, though that is not to say that it will not yet become even more intense. Up till quite recently the capitals of the two belligerents had been left alone. For our part, certain military targets in the Berlin area had been on our schedule for some time past, and in any case would have been attacked in time, and the date for dealing with them was only moved forward. We are definitely attacking Germany, not merely standing on the defensive and only hitting out when she prods us into action. Also we are working on a very definite bombing plan, based on the determination to curtail Germany's power to carry on the war. The German plan in the main seems to be an attempt to weaken our defensive powers, and therefore the most serious attacks are directed against our fighter aerodromes and those factories which turn out fighter aeroplanes.

There is this difference between the two methods: The Germans have only used real weight of numbers in daylight raids, while we do our most effective work by night. Our air crews have been well trained in night work, and they are now benefiting from the practice given them by the leaflet raids in finding their way over Germany by night. At night the German bombers have largely wandered about like lost souls, dropping bombs at intervals for no discernible reason. Probably they are training air crews in night work, with the secondary object of spoiling the sleep of British people and keeping them on the stretch. British nerve is not to be broken by such methods.

Of the German daylight raids it can be said that what was foretold has happened. Some of the bombers reach their objectives and do some damage; but they lose very heavily from the defence put up by our splendid fighters, and by the improving marksmanship of the A.A. gunners. There is no sign of the German campaign achieving its hoped-for end.

Failure of the Regia Aeronautica

WE have reached the end of a year of war against Germany, and have been able to take stock to some extent. Italy has only been in the war for a few months, and it would be early to generalise from the operations round the Mediterranean and the Red Sea. Of course, the defection of the French colonies has considerably altered the balance of power in those parts. Our strategy there had reckoned on the French giving most valuable help to us, and now we have to face the Italian forces alone. The enemy has a superiority of land forces in Northern and Eastern Africa, and therefore is able to take the initiative in major operations. This superiority has its drawbacks. In a land where all movements are governed by the water supply, and where roads are few and mostly bad, it is not easy to move large bodies of men. Concealment is impossible from the observation of our aircraft.

Though the strategical initiative must rest with the Italians, enterprise in harrying actions has been most markedly shown by our own forces—naval, air and military. We have undertaken far more bombing raids against the enemy than the Italians have attempted against us. In air combats our Gladiators have easily and convincingly shown their mastery over enemy bombers and enemy fighters. What is more, our command of the sea has enabled us to reinforce, and as a result Hurricanes have made their appearance in the western desert. To some degree reinforcement of the Italian troops in Libya is possible, but the ships which undertake it have to run the grave risk of interception by the Royal Navy. The enemy forces in East Africa cannot be reinforced, except perhaps by long occasional night flights by bombers from Libya.

Above all, the *Regia Aeronautica* has not done the main work which was expected of it. It has not driven our Navy out of the Mediterranean or crippled its power of action. Without command of the sea, Italy cannot win.

Lebensraum

FOREIGN visitors to the greatest city in the world have often been amazed, and sometimes not a little amused at the average Englishman's determination to have a little house of his own. They have pointed out how much time the average Londoner loses by having to travel twice a day between his office and his house. But London has gone on growing and spreading, until at the present time one may drive through streets for something like thirty miles from the outskirts on one side to those on the other.

In spite of the "flat craze" which began a few years ago, the Londoner on the whole prefers straphanging his way horizontally to a little house with a little garden in the suburbs, rather than rising vertically in a lift to the fortieth floor of a concrete box. He probably does not realise it in the least, but his love of fresh air is proving something of a life saver during air raids.

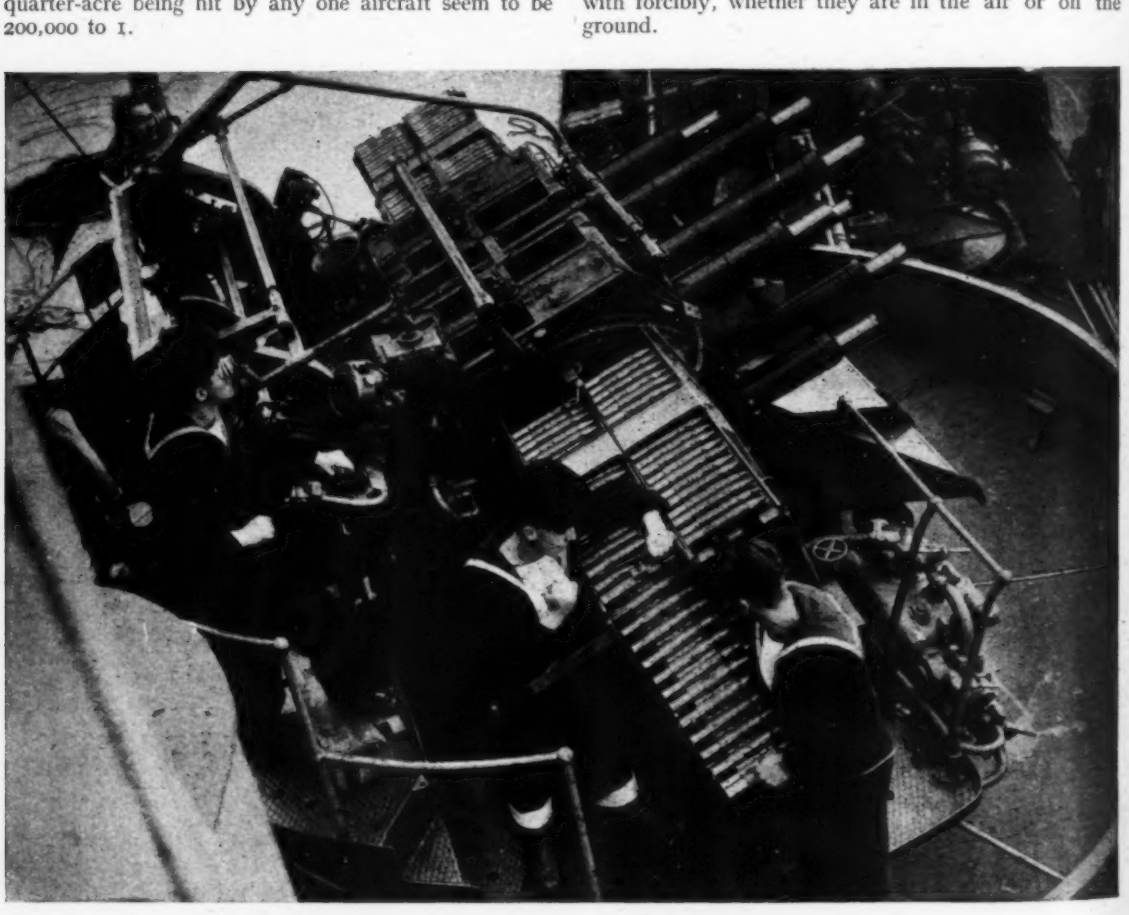
If it is assumed that the diameter of London is in the neighbourhood of thirty miles, the area covered by London is something like 700 square miles. At school we were taught that each square mile contains 640 acres. It is probably reasonable to take the area in which an average bomb can do material damage as one quarter of an acre. This represents a square with sides measuring 35 yards. In London's 700 square miles there are approximately two million quarter-acres, and if we assume that each enemy bomber carries an average of ten bombs of different sort, the chances of any one quarter-acre being hit by any one aircraft seem to be 200,000 to 1.

Let Us Be Fair

INDIGNATION has been expressed in some quarters because German airmen have been shooting British pilots descending by parachute from their wrecked machines. This has been represented as yet another German atrocity. There have been enough German atrocities, and to spare, in this war, as everybody knows, but this particular act cannot justly be so described. In the last war pilots used to discuss the ethics of this matter, but as parachutes were few the question did not often arise. French and British pilots mostly considered it unchivalrous and unsporting to shoot at a man in such straits. In reality ethics and chivalry have nothing to do with the case. The accepted rules of war are clear. The Germans often violate them, but that is no reason for blaming them when they do not break them.

Everything depends on where the parachutist is going to land. If he is coming down on enemy territory where he will be made prisoner, he must be presumed to have surrendered, and his surrender ought to be accepted. The airmen of the side to which the territory belongs have no right to fire at him. If, on the other hand, he is descending on his own territory, as in the case of a British pilot over Great Britain, he will presumably live to fight another day, and the enemy therefore break no rules of war in doing their best to incapacitate him.

These rules, of course, apply only to the cases of men escaping by parachute. Men who come down that way with the intention of invading this country must be dealt with forcibly, whether they are in the air or on the ground.



A CURTAIN RAISER : One of the pom-poms used with such deadly effect by the Navy.

WAR in the AIR

NEW SUITINGS AND SHAPINGS: A formation of long-nosed Blenheims with the new sky-coloured undersides. Observant readers will notice other things on the undersides as well.

A Week of Heavy Raiding : Berlin and London Both Attacked

OF late the Germans seem to have been changing or developing their tactics in their air attacks on Britain. After the conquest of France they started moving their air divisions up from Western Germany to stations on the French coast, placing the fighters and dive-bombers well forward and the heavy bombers further inland. This process took time, as the communications had been badly knocked about during the Battle of France, and heavy bomber squadrons need a lot of gear. While this move was in progress they made attacks on convoys in the Channel, with very little effect. In these operations they used the dive-bombers a good deal. They had been very useful when co-operating with the tanks in the land fighting, but when that ceased the Germans seemed to regard them as no longer of great importance, but rather as instruments which could be used up in experimental actions.

Next they embarked on a campaign for breaking down the resistance of the R.A.F., realising that this was a necessary preliminary to any scheme of invasion or otherwise imposing their will on this country by means of air action. They seemed less concerned about limiting the scope of our own bombing raids on Germany, doubtless arguing that these would naturally cease if they could cripple our own air defence and so beat Britain to her knees. Therefore they selected as targets our fighter aerodromes and the factories which make fighters. The results must so far have been disappointing to them. They have bombed some of our fighter aerodromes, but a well-organised aerodrome can continue to function even after a lot of bombing. We discovered that fact for ourselves when we tried to bomb Stavanger out of action and did not succeed. The enemy attacks on our fighter factories have also produced little effect.

Starting with raids by a couple of hundred machines or so against one aerodrome, and suffering heavy casualties in the process, they have lately tried to synchronise large-scale attacks on two or more districts at the same time, with the obvious intention of preventing concentrations of our fighters. The latter, however, have continued to take heavy toll of the raiders, and synchronised attacks are always difficult matters to arrange, as every staff officer knows. The *Luftwaffe* is a comparatively recent creation, and therefore cannot have a staff with the continuous experience of operations such as the staffs of the R.A.F. Commands and Groups have been able to acquire.

So, rather reluctantly it would seem, the Germans have begun to indulge more than at first in night raiding. It has always been their doctrine that night bombing is not sufficiently accurate to give useful military results, but of late it would seem that they have decided to give more of their pilots training in night flying. Provided that they sent their machines singly to various parts of the country, they reckoned that they would not suffer heavy losses. Probably they hope that in time they will be able to achieve something approaching the deadly accuracy of the R.A.F. night raids on German production and communications. Doubtless they also hoped that these raids would do something to shake British *moral*. The German has always been a bad judge of the effect of his actions on other people.

Raids and Counter-raids

FOLLOWING the day of heavy raiding on *Saturday, August 24*, which was recorded in our last issue, some bombers flew over London that night. The chief damage which they did was to injure St. Giles' Church, Cripplegate, where John Milton is buried. One bomb knocked the statue of the poet off its pedestal, but did not damage it seriously. Of course, the bomber, flying at a great height, could not have aimed deliberately at the church, for if he had he would have missed it; but the incident aroused indignation, not only here, but also in the United States. Milton, like Shakespeare, is a common heritage of the English-speaking world.

That night our bombers went in strength to the Daimler-Benz works near Stuttgart, also raiding the synthetic oil plant at Frankfurt-on-Main, and once more bombed the Magneto Marelli factory in the Sesto San Giovanni district of Milan and the Savoia works at Sesto Calende near Lake Maggiore.

In the afternoon of *Sunday, August 25*, about 150 German machines attacked the Portland area, but lost at least 43 of their number. The A.A. gunners there, who are improving vastly with practice, accounted for six, while the R.A.F. fighters shot down the rest. Altogether the German losses round and over Britain were 55. During that day we lost 13 machines, but four of the pilots survived.

WILL O' THE WISPS: London's sky patterned by the searchlight beams.

At night the German bombers went in some strength against Midland towns, and a few bombs were dropped on the outskirts of London with little result of any use to the enemy. There were the usual sporadic raids elsewhere.

The plans of our Bomber Command had always included the destruction of certain military targets in the Berlin area, and the enemy's attack on London was a good reason, not for entering on a policy of reprisals but for moving the Berlin objectives forward to an earlier place in the schedule. So that night we sent a formation with bombs on to the German capital for the first time. It was hampered by bad weather, but the leaflet raids had made many of our pilots familiar with the way there.

Over Berlin

ONE of our pilots, describing this raid on Berlin, which was his twenty-fifth of the war, said:—

"When at the 'briefing' before we started the intelligence officer mentioned Berlin, everybody was pleased. We were all very keen to have a crack at it, for we had been hoping to do so for some time. So far as the general details were concerned it was just another trip. After the 'briefing' we went to the crew room and worked out our course and how we intended to go in. Then we had a bit of dinner. The weather was bad right from the start, and as soon as we gained any height at all we ran into heavy cloud. It was the same the whole way, and during the journey we caught sight of only three small gaps in the cloud. For at least two-thirds of the way there was very heavy anti-aircraft fire, much more than usual. One might almost have thought that the Germans were expecting us. Twice I had to take violent evasive action to escape the shells. When we arrived over Berlin there was a formidable concentration of guns and searchlights. We cruised around for half an hour before we located the target, and all the time the guns were popping off at us quite accurately. Then suddenly we saw a small gap beginning to open in the clouds three or four miles away and we made for it. First of all we thought we could see a main-road junction. Then the hole in the clouds widened still more and we saw that we were right. Next we caught sight of the reflection of the moon on a lake, and these two points gave us our position. Working down the lake we got on to our target. More 'Flak' and searchlights than ever started and we could not keep a steady enough course to bomb the first time. So we did a preliminary canter. Then we went away and two or three minutes later we came back. We didn't dare to go very far away because, having had that bit of luck in finding the place, we were afraid of losing it once more in the clouds. We went just far enough to shake off the guns and searchlights, and then came right back over the target. By this time the friendly gap had opened up just a bit more. Having dropped our bombs we turned away, dodging violently because the guns were getting warm again. We could see a large red fire burning, and then the clouds finally closed over the scene."

A Sunderland's Feat

THAT night also saw a spectacular feat by a Sunderland flying boat of the Coastal Command. Its journey represented a direct flight of longer than from London to Rome and back. In a flight from London it would have represented a tour of the capitals of Western Europe to The Hague, Berlin, Prague, Vienna, Budapest, Belgrade, Sofia, and then to Salonica. When the Sunderland flying boat reached Tromso in the early hours of the morning it came down to 50 feet above the water. The crew saw eight Heinkel 115 float-planes at their moorings. The front gunner got two very full bursts into at least two of the enemy aircraft. Then the Sunderland climbed steeply to 600 feet for a bombing attack. Three heavy bombs were released from this height. There was one direct hit, and two near misses which were bound to have caused great damage. The crew of the Sunderland saw two of the German float-planes sink and another set on fire. The remaining five enemy aircraft on the water were very severely damaged and may be regarded as unserviceable. The Sunderland next swooped on five enemy supply ships in Tromso Sound and raked their decks with machine-gun fire. The captain of the Sunderland then spotted three fuel dumps on the south side of Tromso Harbour and his front gunner put sustained bursts among them. These attacks were quite incidental to the long flight of the Sunderland. After registering on these targets it proceeded to continue the reconnaissance on which it had been sent out.

Monday, Aug. 26, opened rather quietly, but the calm was disturbed about noon when a force of enemy bombers escorted by fighters approached the S.E. coast and split into several parties. Some attacked the balloons at Dover, others bombed buildings in the centre of Folkestone, causing a few casualties, while the rest came inland but turned back when our fighters got at them. In the afternoon more enemy aircraft came up the Thames Estuary and approached London, but were scattered by A.A. fire and by fighters. Bombs were also dropped in the Scilly Isles.

CUPID'S BOW: An aircraftman carves himself a souvenir from a German wreck.

WAR IN THE AIR (CONTINUED)

SAND DEVILS : Italian bombs exploding at Mersa Matruh.

It is to be assumed that they were after the aerodrome, but on this occasion they did not hurt anybody. During the day's fighting a new Czech squadron was in action and scored some successes. The men had previously fought in France in French machines, and had made their way to this country via North Africa. A Defiant squadron was also in action again and shot down three or four Dorniers. In some cases the Germans sent 100 fighters to escort 50 bombers—a great compliment to our fighters. Such a body came over Essex, but nine Hurricanes in close formation made head-on attacks and shot down two Dorniers, crippling two more. Over Portsmouth a Spitfire squadron dived out of the sun and shot down four Heinkel 111s out of a large formation before the escort could interfere. This turned the raid aside.

That night the Midlands were again the chief objective of the enemy, and fires were caused and industrial property was damaged in two towns. There were a number of casualties, including some killed.

Single bombers flew in circles over London during the night, and kept it up for six hours. A small number of bombs was dropped, but the results were not serious. The Germans' plan was not obvious, but the interference with the sleep of London was probably a secondary object.

Haifa was again raided by the Italians in the afternoon. There were a few civilian casualties but none was fatal.

Our Own Raids

OUR bombers that night raided Northern Italy for the fifth time in a fortnight. As a senior officer has put it, when you are fighting a tiger and a terrier snaps at your heels, you have to turn sometimes and kick the terrier. While our bombers were doing their work two Italian fighters appeared, but they did not interfere with the proceedings.

In Germany the I.G. Farbenindustrie synthetic oil works at Leuna were bombed for the second time. The first raid there took place on Aug. 16. Other targets on the Continent were also raided.

The enemy's loss in aircraft during the day was 47. We lost four pilots and two air gunners.

Tuesday, Aug. 27, was again a comparatively quiet day in the air so far as raids on Britain were concerned. Up to 6 p.m. the only bombs which had been dropped fell on the foreshore of the Isle of Wight and did no damage. There were again sporadic raids during the night, and London was visited again, but the damage was nowhere serious. Some people were killed in towns in the S.E. and the North.

During the night our indefatigable bombers did more damage to the Fiat works at Turin and the magneto works at Milan, but ice-forming conditions were bad, and one bomber had to turn back owing to the serious icing-up on its wings. Kiel and Wilhelmshaven, both targets of primary importance, were raided again, and some of the repair work undertaken after the last raid was probably upset. We lost one bomber that night, but that was hardly surprising, for the pilots reported the *Flak* (*i.e.*, anti-aircraft fire) more intense than ever.

The Prime Minister, Mr. Churchill, visited Dover on *Wednesday, Aug. 28*, and, donning his steel helmet, watched some fierce air fighting. Seven German machines were shot down before his eyes in less than an hour. It was a day of intense air activity, and this activity continued during the night. There was damage done to industrial property, as well as to houses, in a Midland town, and small numbers of German aeroplanes flew far and wide over the country during the night, doing small amounts of damage and killing and wounding civilians, though the slaughter was not great. The raiding over London lasted for roughly seven hours, but the damage done was mainly to the houses of the poor. One interesting survival of the Dark Ages, a toll gate, was obliterated. It had escaped the campaign of Mr. Hore-Belisha, who declared war on all such obstructions to transport, only to fall before the knights of Hitler.

The German losses in the day's fighting were 28 machines, one by A.A. fire. The R.A.F. lost 14 machines, and from these seven pilots and three air gunners were killed or missing.

A Coveted Job

THE raid on Berlin on the night of Sunday-Monday had not been a great success, owing to the bad weather, but on this night (Wednesday, 28 - Thursday, 29) we sent our heavy bombers there again, with much better results. Our pilots were tremendously enthusiastic about this raid, and two of them tossed up for the privilege of taking part in it. Each machine took its own route, and some of them were dodging searchlights and *Flak* pretty well all the way. One definite target, about four miles from the centre of the city, had been given to all the pilots, and they took great pains to be sure they identified it. They spent a considerable time circling over the Berlin area. All returned safely, and though two of the machines made forced landings the crews are safe.

Some figures of German losses have been made public lately. The Air Ministry states that from the outbreak of war to August 26 the R.A.F. has destroyed 3,366 German machines. The Navy has also made its contribution to the good work. Up to August 12 the A.A. guns of the Fleet shot down 122 German machines for certain, while the Fleet Air Arm accounted for 28. The numbers "probably destroyed" were 64 and 25 respectively.

Many readers have probably wondered what it feels like to make a descent by parachute—baling out, as R.A.F

WAR IN THE AIR (CONTINUED)

slang has it. Here is a description of a descent by an officer of the Fighter Command. In his Hurricane he had been doing a lot of fighting, had shot down two Me. 109s into the sea, and had lost sight of the rest of his squadron when he was attacked by two enemy fighters. "I twisted and turned," he said, "but they were too accurate. I could hear the deafening thud of their bullets. Pieces of my aircraft seemed to be flying off in all directions: my engine was damaged and I could not climb back to the cloud where I might have lost my pursuers. Then came a cold stinging pain in my left foot. One of the Jerry bullets had found its mark, but it really did not hurt. I was about to dive to the sea and make my escape, low down, when the control column became useless in my hand. Black smoke poured into the cockpit and I could not see. I knew that the time had come for me to depart. Everything after this was perfectly calm. I was at about 10,000 feet, but some miles out to sea. I lifted my seat, undid my strap and opened the hood. The wind became my ally. A hand—actually, the slip-stream catching under my helmet—seemed to lift me out of the cockpit. It was a pleasant sensation. I was in mid-air—floating down so peacefully—in the cool breeze. I had to remind myself to pull my ripcord and open my parachute. When the first jerk was over I swung like a pendulum. This was not so pleasant, but I soon settled down and I was able to enjoy a full view of the world below—the beach, some miles away, with soldiers—and the long lines of villas in a coastal town. There was no sensation of speed. But the ripples on the water became bigger—the soldiers on the beach became nearer.

"I had one minute of anxiety. As I floated down, one of the Messerschmitts appeared. The pilot circled round me and I was just a little alarmed. Would he shoot? Well—he didn't. He behaved quite well. He opened his hood, waved to me and then dived towards the sea and made off towards France. The wind was still friendly. It was carrying me in towards the beach. I took out my cigarettes and lit one with my lighter without any difficulty. Ages seemed to pass. I threw away the cigarette as I came nearer and nearer to the coast. I could hear the all-clear sirens—and, passing over the houses on the sea front, I could see the people coming out of their shelters—people looking up at me. I had descended to about 1,000 feet. I began to sway a little and I could hear my parachute flapping—like the sound of a sail in a small boat. The soldiers' faces were quite clear, but I must have looked English—even at 1,000 feet—which was comforting. For the first time since the enemy pilot circled around me I became anxious. Was I to end my escapade by being banged against a seaside villa? It did not seem possible that I could reach the fields beyond. The journey ended in a cucumber frame—after I had pushed myself free of a house with my foot."

The Raids on London

ON *Thursday, August* 29, large numbers of enemy aircraft approached our coasts, but only a few penetrated inland. The rest were dispersed by our fighters. The Germans lost 11 machines that day, and we lost nine fighters but only two pilots.

That night our bombers raided the Krupp works at Essen and other targets.

Attempts were made by the enemy to get to London again on *Friday, August* 30, by daylight. Some reached the outskirts and dropped bombs, and attacks were also made on fighter aerodromes in the Home counties. Some private property was damaged and a number of people were killed. Our fighters and A.A. guns repulsed the main force of the attack, and between them shot down 62 machines. We lost 25 fighters, but 15 of the pilots are safe.

On *Saturday, August* 31, the enemy attempts against this country rose to a peak. Fighting went on continuously all day against great masses of raiders, and six times between dawn and midnight were Londoners invited to take cover. The failure of the German attack was resounding. The raiders lost 85 machines, while we lost 37 machines of which 25 pilots were safe. The A.A. guns had their best day, and shot down 15 raiders. Perhaps as a result of this, *Sunday, September* 1, passed in comparative peace, so far as London was concerned, and the night was spent in peaceful slumber. None the less, the Germans lost between 20 and 30 machines in the day. Over 1,000 German aircraft were destroyed during the month of August in raids on Great Britain.

Bad for Berlin

THE R.A.F. raid on Berlin that night (Friday) lasted between two and three hours. Our bombers made direct hits on important military targets which included petrol installations, aircraft factories and aerodromes. Fifteen tons of high explosive bombs were dropped by one section of the raiders and over seven hundred and fifty incendiaries. The raid began before midnight and the last aircraft did not leave the target until 2.30 a.m. An electrical works and an adjoining railway junction sustained considerable damage when bombs were dropped along the railway and the eastern section of the factories. Explosions were still continuing at the works ten minutes after the attack was over. An aircraft factory was bombed and two sticks of bombs were seen to fall well on the target. Several aircraft attacked oil stocks elsewhere in the outskirts of the city. After locating the target with precision, they bombed it continuously. Two sticks of bombs were dropped by the first aircraft and bursts were seen across the target. Fires in this area guided other pilots, who, after making careful runs over the objective, straddled it with their bombs. One attack caused fires visible for ten minutes; another increased the strength and number of the fires, and the observer reported seeing the blaze from a distance of forty-five miles. Three further fires broke out as the next raider left. A stick of bombs was dropped across a factory (which makes war material) north of Berlin and another close to the buildings on one of the city's aerodromes. A petroleum store was bombed through the clouds, which made observations of results difficult, but after circling round following this attack, observers reported that a deep red glow illuminated the undersides of the clouds as the aircraft left the scene. Other aircraft operating over another of the city's aerodromes scored direct hits on it. Fires were seen to break out near the aerodrome buildings after one attack, and fires and two large explosions were caused by later bombing. Hits were also observed on a third aerodrome in the Berlin area.

The ground defences over Berlin were very active. Searchlights were numerous and brilliant. Anti-aircraft fire was intense and accurate. Some of our aircraft were holed through the wings. One machine forced landed as it neared the English coast. Three of its crew baled out, but the other two succeeded in bringing the bomber close to the beach with apparently very slight damage. Of the three men who baled out two have been rescued and search made for the third.

Another section of the raiding force bombed warehouses along the dockside at Hamburg, registering direct hits and causing five large fires, while at Bremen aircraft bombed a goods yard, where bright yellow fires continued to spread some time after the last bomb had fallen.

Four-engined Bombers

FOUR-ENGINED bombers appeared in some of the raids over England on *Monday, September* 2, escorted by very large formations of fighters. These were very probably military conversions of the Focke-Wulf Condor passenger machine, or possibly specimens of the Junkers 90. The appearance of four-engined machines had been expected by our Air Staff. The cruising speed of the Condor is about 230-240 m.p.h. It has a long range, which cannot be needed for a trip from France, and therefore it probably carries a very heavy bomb.

HEAVY RESPONSIBILITIES

The Air Council in Session

MEMBERS of the Air Council, from left to right, are: Acting Air Marshal A. G. R. Garrod, O.B.E., M.C., D.F.C.; Sir Harold G. Howitt, D.S.O., M.C., F.C.A.; Air Marshal Sir Christopher L. Courtney, K.C.B., C.B.E., D.S.O.; Air Marshal E. L. Gossage, C.B., C.V.O., D.S.O., M.C.; Capt. H. H. Balfour, M.C., M.P.; Sir Archibald Sinclair; Air Chief Marshal Sir Cyril L. N. Newall, G.C.B., C.M.G., C.B.E., A.M.; Sir Arthur Street, K.B.E., C.B., C.M.G., C.I.E., M.C.; Air Marshal Sir Wilfred R. Freeman, K.C.B., D.S.O., M.C.; Sir Charles Craven, O.B.E.

In the foreground are, on the left, Mr. F. R. Howard, Secretary to the Air Council; on the right, Flt. Lt. W. W. Wakefield, M.P., Parliamentary Private Secretary to Capt. Balfour, and Mr. R. H. Melville, Private Secretary to Sir Archibald Sinclair.

Sir Archibald Sinclair, Secretary of State for Air, and Capt. Balfour, Under-Secretary of State, will need no introduction to our readers, except that it might be pointed out that Capt. Balfour was a pilot in the last war, and that he has flown the single-seater fighters used in the present war.

Sir Cyril Newall is Chief of the Air Staff, having succeeded Sir Edward Ellington in 1937. He learned to fly in 1911 while on leave from the Army. In the last war he was mentioned in despatches three times, and in 1916 he was awarded the Albert Medal for conspicuous gallantry in leading a small party into a burning R.F.C. bomb store and putting out the flames.

Air Marshal Sir Christopher Courtney became Air Member for Supply and Organisation in January of this year. Originally commissioned in the R.N., he was seconded to the R.F.C. in 1913. In the last war he served with No. 4 Squadron at Dover and Dunkirk.

Air Marshal Gossage, Air Member for Personnel, was seconded from the Royal Artillery to the R.F.C. in 1915. He was mentioned in despatches four times, and was awarded the D.S.O. and the M.C.

Air Chief Marshal Sir Wilfred Freeman also began his career in the Army. He was seconded to the R.F.C. in 1913 and went on active service in August, 1914, with No. 2 Squadron. He is now Air Member for Development and Production.

Air Marshal Garrod, Air Member for Training, was seconded to the R.F.C. in 1915 from the Leicestershire Regiment. He was awarded the M.C. and D.F.C. and at one period after the last war was chief instructor at the Oxford University Air Squadron. He has had wide experience of training and staff work.

Sir Harold G. Howitt is an Additional Member of the Air Council, and Sir Arthur Street is Permanent Under-Secretary of State for Air.

Sir Charles Craven resigned his chairmanship of the Vickers-Armstrongs group to take up the post of Civil Member for Development and Production.

THE PROTECTORS

Hurricane Attack on Ju 88s

SOME six or seven years ago, when the Air Ministry made a rather belated decision to re-equip the Royal Air Force with monoplanes (with the exception of training types), the aircraft industry had to tackle two problems—expansion of production and change of design—both at the same time. It is to the everlasting credit of our design staffs that not one of these first attempts proved a failure.

In no type was this superlative performance more pronounced than in our single-seater eight-gun fighters which are, despite their five years of service, still the envy of every air force.

During the dreadful period of retreat in the Low Countries and in France, and again during the recent mass attacks on this country, the Hurricane has borne the brunt of battle and has emerged victorious. Formations many times more numerous have been attacked with the utmost bravery and confidence, and it has now become a normal expectation that at least four of the enemy will fall for every one of ours lost. It is even possible that historians at some future date will credit the eight-gun fighters and their pilots with being the saviours of the nation.

Speed and Manœuvrability

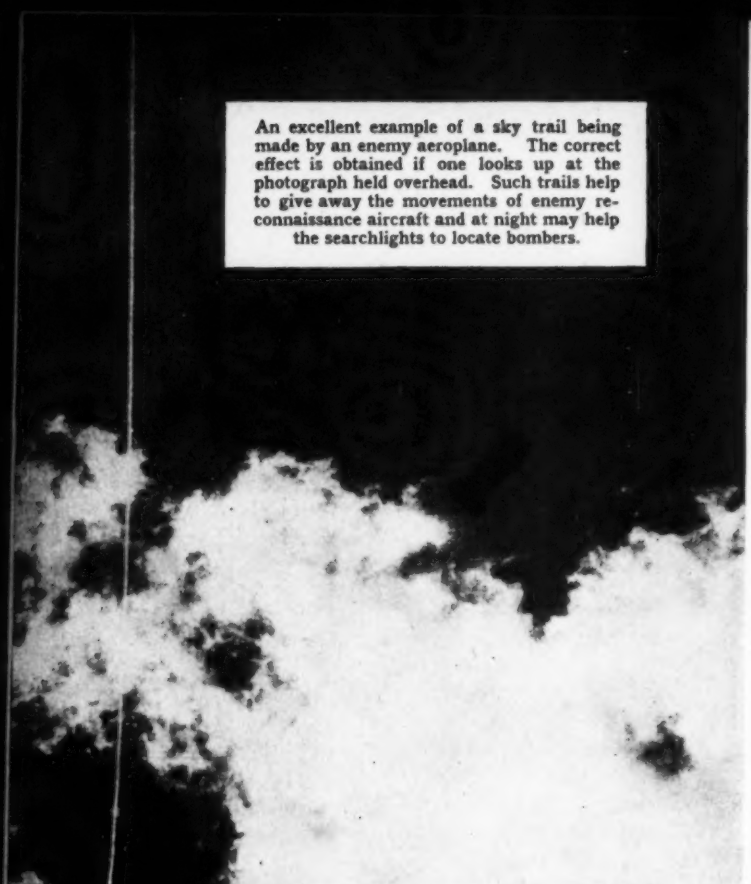
With fuel of 87 octane value and a two-bladed, fixed-pitch airscrew, the Hurricane has a maximum speed of 330 m.p.h. at 17,500ft.; a climb to 20,000ft. in nine minutes, and a landing speed of 62 m.p.h. It is powered, of course, with a Rolls-Royce Merlin engine of some 1,000 h.p. The use of petrol of a higher octane value and a constant-speed airscrew enhances the performance considerably. In both cases the machine is very manœuvrable.

The eight Browning guns are disposed in two groups of four, and are all carried outside the airscrew disc in order that full advantage may be taken of their rapid rate of fire. Each gun is capable of firing at a rate of 1,200 rounds per minute, whereas a gun firing through the airscrew disc with the aid of interrupter gear is limited to some 500 rounds per minute. The placing of the Hurricane's guns side by side in close proximity to one another has a good deal to do with its success as a fighter. The terrific stream of bullets impacts upon a comparatively small area, and it is fairly common for a structural breakage to occur after a Hurricane attack. It is interesting to note that some 30 m.p.h. is lost from the forward speed of the machine when the guns are fired, the recoil of the guns being so pronounced.

The Hurricane, owing to its fabric-covered girder fuselage structure, is an easy machine to service in the field because nearly the whole of the side of the fuselage can be removed in panels.

VISIBLE VORTICES

Their Formation Established : Wing Tip and Slipstream Trails : The Evidence Summarised



An excellent example of a sky trail being made by an enemy aeroplane. The correct effect is obtained if one looks up at the photograph held overhead. Such trails help to give away the movements of enemy reconnaissance aircraft and at night may help the searchlights to locate bombers.

AFTER studying the numerous letters which obliging readers have sent in relating their observations in regard to the white sky trails which are now seen so often, it has become possible to collate the data and to arrive at some conclusions. These conclusions cannot be called "definite" in the strict scientific sense, as they have not been derived from experiments deliberately undertaken to prove them with scientific observers in the aircraft taking readings of temperature, altitude and humidity. But the careful manner in which most of the letters have set forth the details of the phenomena seen leads one to place considerable weight upon the statements in them and it is thought that certain conclusions, "definite" in the ordinary sense of the word, can be established.

Firstly, there are two phenomena: the wing tip trail, and the trail formed of air which has passed through the airscrew and is therefore helical in shape. These two types should be thought of separately. Considering first the wing tip trail, it is evident that numerous examples of this have been seen both by pilots and ground observers, and that the trails occur under conditions of high speed or heavy wing loading (dives, pull-outs and steep turns). That is to say, they occur when the wing tip vortex is strong. Some evidence exists that the condensation starts at the centre of the vortex.

The trails exist as short plumes behind the wing tips and disappear in a few seconds, suggesting fairly conclusively that they are water vapour temporarily condensed by low pressure. Two accounts give them as occurring at altitudes of only a few thousand feet at which the temperature was probably above freezing. So it is unlikely that they are finely divided ice particles.

It seems, then, a fair conclusion to say that these wing tip trails are real visible vortices. Whether they would be permanent (in the sense of lasting for an hour or so) if made at a higher altitude with the temperature below freezing, is not established, but perhaps this theory may be tested later by some enterprising pilot. (There is one instance in the letters of a permanent double trail from a single-engined machine at a high altitude, but a single example cannot be regarded as conclusive.)

One isolated instance is recorded of a flat trail being left, corresponding in width to the wing span. This is most interesting, particularly as the aeroplane concerned was a Spitfire. The more nearly the wing loading corresponds to an elliptical curve, the less does the vortex tend to be concentrated at the wing tip, and the more does it approach to an evenly distributed vortex sheet across the whole span. Due to its wing plan form, the Spitfire wing loading must be nearly elliptical, hence the flat trail.

The other type of trail has several other characteristics. It does not immediately disappear, and seems to be as permanent as the meteorological conditions into which it has been born. It is invariably white and has not been reported at low altitudes, being usually above 15,000 feet. Another important characteristic is that when low enough for its structure to be seen it is clearly of helical shape. For this reason this type of trail might well be called a "slipstream trail." Such a name avoids any controversy about whether the condensed vapour comes from the exhaust or from the air itself—although this point will be dealt with later. It has also been reported that double trails have been made by twin-engined aircraft, which is an additional reason for using the name "slipstream trail."

Such trails are intermittent. That point has been clearly established by photographs and statements. The slipstream trail will extend for some distance behind an aeroplane and then for no apparent reason will fail to form. After some distance, either short or long, it will start again. This does not necessarily occur when the aeroplane is climbing; it may occur during level flight. It is thought that this piece of evidence is particularly significant, and that a deduction may be made from this to give an indication as to the source of the water which is condensed to vapour or frozen to ice particles.

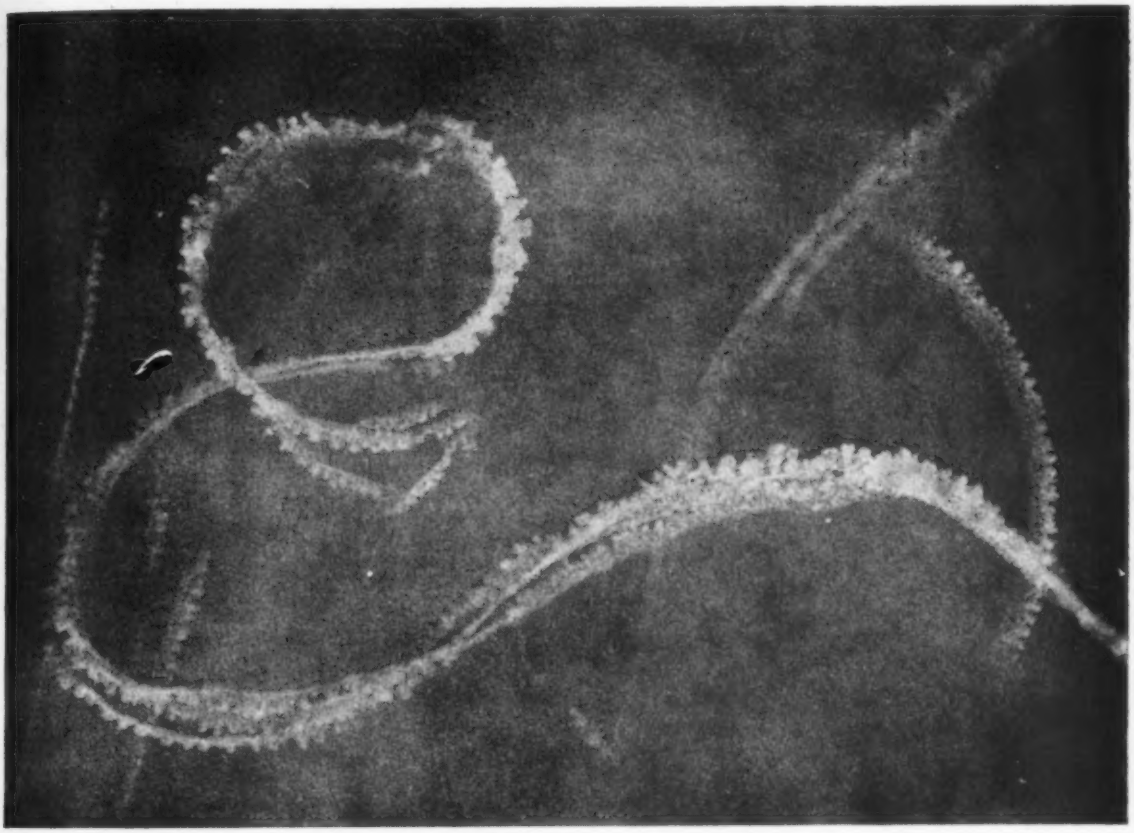
Super-cooled Water Vapour

Since the flight is level, exhaust gases are being produced all the time. Perhaps in varying quantity, if the throttle opening is varied, but unless the aeroplane glides with engine off there is always some exhaust. In general, it is likely that engine conditions would not be varied very much. Nor is it likely that there would be much variation of temperature at the same altitude when that altitude is of the order of 15,000 to 25,000 feet. It therefore seems reasonable to say that if it were only the condensation of exhaust gas which caused the trail, the trail would be continuous, since the conditions for its formation seem to exist everywhere along its track, if that track is level. But all agree that breaks occur.

The other view seems to be the more likely, that the trail is due to the freezing of super-cooled water vapour through which the aeroplane passes. That this can exist in "patches" in the atmosphere has been stated by correspondents and the phenomena of super-cooling and super-saturation is well known in any laboratory. (Super-cooled rain which became the most slippery ice as soon as it hit the roadway was seen—and felt—at Brighton in the unusually bad weather of last January.)

As the trails have only been reported under conditions of calm with cumulus or cirrus clouds, there would be little mixing of the different patches. The effect of mixing is very clearly described by one correspondent who was

VISIBLE VORTICES (CONTINUED)



In the heat of the battle our fighters have not time to sky-write that they are encountering enemy aircraft, and the remarkable shape of these sky trails, made during an air battle over the Kent coast on August 28, must be put down to strange coincidence.

able to disperse small clouds by diving through them.

For freezing of a super-cooled liquid or vapour to occur it is necessary to have nuclei or a disturbance to start the process. Both are available in abundant quantity with the passage of the aeroplane. At least some of the steam in the exhaust will be condensed to water droplets, and one should not forget the solid particles of lead oxide which are formed by the oxidation of the tetra-ethyl lead in the fuel. And as for disturbance, the whirling of the airscrew with a tip speed of about 800 ft./sec., would be amply sufficient to start the process on its own. Whatever the explanation of slipstream trails, the exhaust gases will be in the helical slipstream in all types of aeroplanes. The fact that water can be in this super-cooled condition at an altitude and not freeze until some disturbance occurs, is probably due to the absence of dust nuclei.

The formation of slipstream trails—if the above is the correct explanation of them—should not depend on the speed of the aeroplane. Though most of the examples seen have been made by the fast Spitfires or Hurricanes, this is probably due to the fact that these are the most frequent visitors to the comparatively high altitudes at which the trails are seen. Also, they are the aircraft which are most frequently seen over England at present. But one correspondent mentions a trail made by a Lysander, and no reason is apparent why a trail should not be made by such an aeroplane.

Other Strange Sights

Some isolated examples of unusual phenomena were written about. One was of small clouds associated with balloons and apparently above them. Without actually seeing the clouds, to hazard an explanation is perhaps dangerous, but they might have been caused by the heated air rising from above each balloon and having its water vapour condense after rising to a higher and colder altitude. The heating of the air above the balloon would be caused by the balloon fabric being "opaque" to the heat rays and so absorbing them and raising the temperature of the air immediately in contact with the upper surface of the balloon.

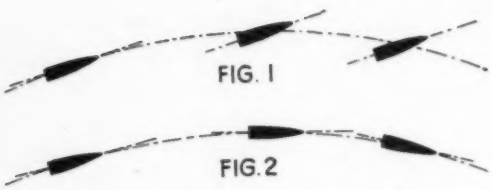
"Visible sound waves" were also reported, and seem a likely explanation of the observation made. Another correspondent, in a letter too late for publication, quoted "many parallel lines faintly discernible moving across the sky. The only thing to which I can liken them is the rippling of water in a gentle breeze." This may be a related phenomenon, but without more evidence it is impossible to say.

While it cannot be pretended that this collection of experiences and theoretical speculations has conclusively proved the origin of the slipstream trails, it does seem likely that the presence of super-cooled water vapour is a necessary condition for their formation. But the effect of the exhaust cannot be ignored, particularly as one correspondent says that the trail is much greater when climbing, that is, when the exhaust is more prolific. But the nature of all sky trails is now much better understood, both the wing-tip trails and the slipstream trails, and several good examples of them have now been photographed. That printed on this page is the most recent one and the best so far seen.

EFFECT of WINDAGE on PROJECTILES

With Special Reference to Aeroplane Gunnery

By F. W. LANCHESTER, LL.D., F.R.S.



At the outset it is necessary to state that the theory of windage depends upon the type of gun from which the projectile is fired, and the type of the projectile itself. In the present article the spherical projectile, whether fired from a smooth bore or from a rifled gun, is excluded from the discussion; the elongate projectile, as almost universal to-day, discharged with a degree of spin imparted to it by the rifling of the piece. This is the problem dealt with.

IT was at one time supposed that the axis of rotation of a projectile maintained a constant direction in space, like that of a celestial body; in some of the old text books this is so represented, as shown in Fig. 1. But this is not so; the axis of rotation follows the direction of the trajectory. It starts tangential to the trajectory and, to a close degree of approximation, it so remains (see Fig. 2). Many readers will doubtless be inclined to challenge this statement. The ballistic expert of one of our leading armament firms in the North did challenge the writer on this very point as recently as 1928. He insisted that Fig. 1 and not Fig. 2 was the correct representation. The argument became heated; ultimately the writer refused to discuss the matter further until his opponent had read and digested Appendix VIIIa of his "Aerial Flight," Vol. II, in which the theory is presented at length.* Within a week the ballistic expert expressed himself as quite convinced, and tendered a handsome apology. It may be asked: "What has this question to do with our title subject?" And again: "By what means has it been found possible to decide between the regime illustrated in Fig. 1 and that illustrated in Fig. 2?" The answer to the first of these questions will appear in due course. The answer to the second is that the drift of a rifle bullet (or other elongate projectile fired from a rifled gun) is, as measured, in quantitative agreement with gyroscopic theory, which also demands that the projectile shall align itself to its direction of flight from instant to instant, as in Fig. 2.

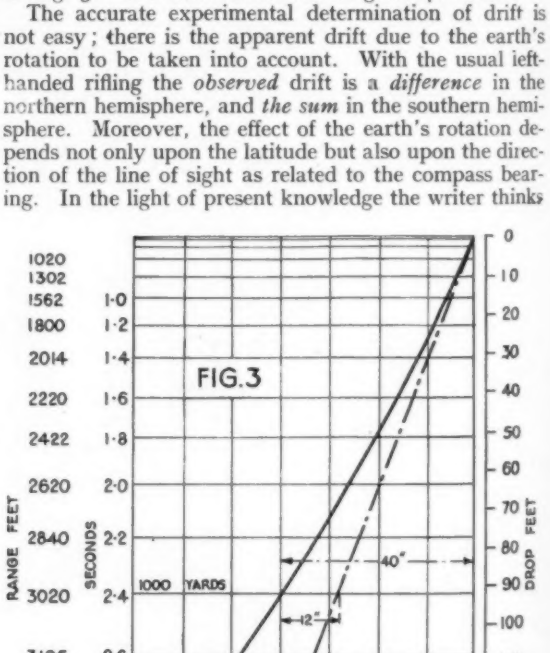
Drift

The use of the word drift in this connection must not be confused with windage; this is merely a matter of terminology. When a projectile is fired from a rifled gun, the trajectory is not found to lie in a vertical plane, but swerves away to the left. That is so if the rifling is a left-hand spiral: in other words, if (as is usual) the direction of rotation, as viewed by the gunner, is counter-clock. This is established beyond question, and the extent of this "drift," as it is termed, is now known (approximately), although when the writer attacked the problem in 1904 there was a wide difference between the data given by different authorities.

In his "Book of the Rifle," the Hon. T. F. Freemantle confessed himself unable to decide between the different expert estimates; he quotes that of Mr. L. R. Tippins as being four feet at 1,000 yards, against eleven inches given in the official "Musketry Regulations." The present writer was able to reconcile these two widely different estimates by an application of gyroscopic theory.

In Fig. 3 is shown the relation of drop (ordinates) to "drift" (abscissæ) for the British service rifle of that period as calculated for ranges up to 1,200 yards. It will be observed that for short ranges, up to a few hundred yards, drop and drift are in constant ratio, represented by an angle of 1° 27′, so that the drift correction for such ranges may be effected by making use of a spirit level (set transversely) at that angle. When this is done the drift at 1,000 yards is as given in the "Musketry Regulations," namely, 11in., or we may say one foot. But under like conditions, if the spirit level is set geometrically, i.e., so that the line of sight is plumb over the axis of the bore, the corresponding figure is more nearly that given by Mr. Tippins. This is clearly shown in Fig. 3. The writer's calculation gives 40 inches.

The accurate experimental determination of drift is not easy; there is the apparent drift due to the earth's rotation to be taken into account. With the usual left-handed rifling the *observed* drift is a *difference* in the northern hemisphere, and *the sum* in the southern hemisphere. Moreover, the effect of the earth's rotation depends not only upon the latitude but also upon the direction of the line of sight as related to the compass bearing. In the light of present knowledge the writer thinks



* First published in "Technics" Newnes). Vol. ii, p. 439 *et sec* 1904.

it well to make use of the term *gyroscopic drift* when reference is made to the "drift" as above.

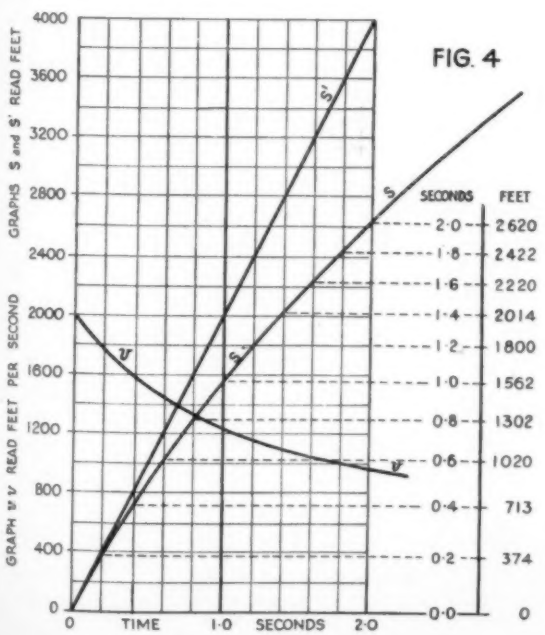
Cause of Gyroscopic Drift, and the Evidence

The precession of the bullet as it follows the trajectory in the manner shown in Fig. 2 means that it must be acted upon by an applied torque or turning moment about a vertical axis, or by one at right angles to the trajectory in a vertical plane; this is in accordance with gyroscopic theory. The components of this turning moment comprise a lateral aerodynamic reaction on the one part and the inertia of the projectile on the other. The former requires that the axis of the projectile, viewed from above, shall be slightly inclined to the left. The latter, which requires that the projectile shall be undergoing lateral acceleration, gives rise to the *gyroscopic drift*. Conversely, the experimental fact of "drift," and its agreement with gyroscopic theory in accordance with Fig. 3, shows that the regime contemplated in Fig. 2 is correct and not that given in Fig. 1. It is not possible to discuss the matter further here, and those interested are referred to the publications cited.

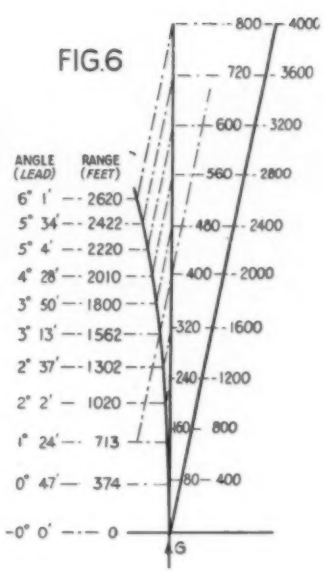
Windage

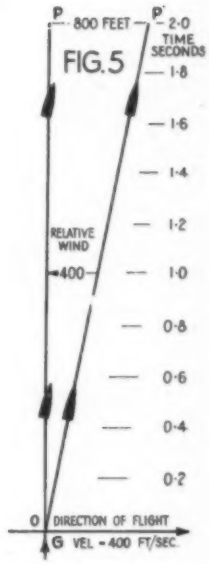
We now pass to consider the bearing of the foregoing on the title subject. We may think of the rifle bullet as behaving in some respects like a spinning top. If it be disturbed in its flight, as, for example, when struck by a side wind, its axis will tend to move in a conical precession. In this case the trajectory becomes a spiral described about an axis which we may regard as the mean trajectory, and in a well-behaved projectile the amplitude of this spiral gradually diminishes and the trajectory becomes normal. There is clear evidence of this in direct visual observation. With the sun at a suitable angle, the flight of a rifle bullet may be followed by the eye; on a calm day it appears as a faint streak of light, best observed against a dark background, but with a stiff side wind the spiral nature of the path is at once manifest, and the flight path appears as a dotted line.

There is further evidence in the fact that under these conditions the mean radial deviation of a bullet may be less at moderate range than at short range when the perturbation has had time to die down. The essential point is that the trajectory initially follows the line of sight, even when a side wind is present. The bullet quickly takes up its correct attitude relatively to the air, just as does an arrow loosed from a bow; it is not *blown sideways* by the wind. Here we come to the crux of the matter; if the bullet did not lose velocity, no windage allowance would be needed at all, and for any actual case the sighting allowance may be calculated if the velocity data be given.



In Fig. 4 a graph $v\ v$ is shown plotted from Bashforth's tables, which relate to the old Lee-Metford service rifle and ammunition. Ordinates give velocity and abscissæ time of flight. This graph, integrated on a time base, gives the graph S S, being the distance travelled from instant to instant. Admittedly Bashforth's tables are a little out of date, but for the present purpose, which is to elucidate rather than to provide exact information, these data will serve as well as any other.





Broadside Firing

In Fig. 5 the gun G is indicated diagrammatically, supposed mounted on an aeroplane, trained at right angles to the direction of flight; in other words, at right angles to the direction of the relative wind. When the bullet is discharged it sets out on its flight in the direction O P′, with its axis pointing in that direction, but quickly changes its attitude so that its path *relatively to the air* is as given by O P′. Observed from the aeroplane, the bullet, unless losing velocity (a regime represented by the line S′ in Fig. 4), would still appear to follow the direction O P, but, if it could be minutely observed, it would be seen that its axis would lie substantially parallel to the line O P′, and then, as stated, no allowance for windage would be necessary.

The trajectory relative to the air, O P′, is at the outset subject to a spiral disturbance, due to its being initiated with the axis of spin parallel to the line O P, and this will of necessity result in a small displacement of the mean trajectory from the line O P′ (relatively to the air) and likewise a similar displacement as observed from the aeroplane, the observed mean trajectory lying parallel to O P though not co-incident therewith. The actual spiral nature of the trajectory, prior to its settling down to a steady state, should be very considerable and easily observed when tracer bullets are employed. This

EFFECT OF WINDAGE ON PROJECTILES (CONTINUED)

"The actual spiral nature of the trajectory . . . should be very considerable and easily observed when tracer bullets are employed." Dr. Lanchester's theory visually confirmed.

should be quite familiar to the gunners when firing at a target broadside from a fast-moving aeroplane.

The amount of this constant displacement though calculable, given the necessary data, will not be dealt with here. To take it into account it would require a correction of constant magnitude to be added algebraically to the windage proper. That would give the mean trajectory, but for such ranges as obtain in aircraft warfare it is doubtful whether anything approaching the mean or steady state condition would be reached. This being so, the calculation would be worthless, since the actual path is a spiral, and the correction would be incapable of having any exact application, it would vary from instant to instant both in magnitude and direction.*

In Fig. 5 the successive positions shown along the lines O P and O P′ are given as the positions occupied by the projectile at successive equal intervals of time, namely 1/5th second, based on a muzzle velocity = 2,000ft./sec. and assuming no loss of velocity. Under this hypothetical condition it will be seen that the flight path relatively to the aeroplane plotted from that relatively to the air as datum will follow the straight line O P, since the ratio of the flight velocity and the relative wind velocity is constant, namely, 2,000/400.

Under actual conditions, owing to the loss of velocity in accordance with data given in Fig. 4, this constant relation no longer holds. For example, in one second the bullet has only travelled 1,562 feet instead of 2,000 feet, as shown in Fig. 6; but the aeroplane has travelled 400 feet in the same time, and this is shown by the construction given, which gives the position of the bullet at this instant as 88 ft. "down wind." To correct this, the point of sight must be directed 88 ft. in front of the "target," which gives the windage as 88/1,562 = 3° 13′ *forward* as the correct sighting allowance for this range. Actually at present very little fighting in the air is done at so great a range (520 yards). It is more usual to reserve fire at point-blank distance, at which no allowances, except for differences of velocity and direction between attacker and attacked, need consideration.

It is the writer's belief that, in the future, the practice will gradually undergo change, and it will be found advantageous *under certain conditions* to open fire at much greater ranges than those which at present find favour. If, for example, an enemy aircraft can be picked out in silhouette, against a luminous sky by a well camouflaged aeroplane from beneath, and the range determined then, flying at the same speed on a parallel course, fire might well be opened at 500 yards range or more, using the sighting allowances given in the accompanying table, or similarly computed allowances founded on more modern data, given for different air speeds as deemed necessary. The enemy would have scant chance of effecting a hit, being hampered by uncertainty as to the range and bad visibility as concerns his target. There are, however, many other conditions when the use of carefully computed tables would be of service in allowing the effective fighting range to be extended.

In the present article the particular case of firing at right angles, or substantially at right angles, to the direction of flight has alone been considered, but *mutatis mutandis* the method given may be applied more generally. The writer hopes to have an opportunity of returning to the subject on a later occasion.

Range (Feet)	Range (Yards)	Windage (Feet)	Windage Allowance (Angle)
2,620	873	276	6° 1′
2,422	810	236	5° 34′
2,220	740	196	5° 4′
2,010	670	157	4° 28′
1,800	600	120	3° 50′
1,562	521	88	3° 13′
1,302	434	60	2° 37′
1,020	340	36.2	2° 2′
713	237	17.4	1° 24′
370	123	6	0° 47′

* Refer: "Aerial Flight." Vol. ii. Fig. 175, p. 385.

Air Strategy—XVIII

TARGET SELECTION for AIR BLOCKADE

By CAPT. NORMAN MACMILLAN, M.C., A.F.C.

WITH unlimited air forces air blockade can be (in theory) complete. But, in practice, accidents, errors in navigation, inaccuracies in bombing, the difficulty of obtaining efficient intelligence of the result of raids, and of the creation of new targets and many other factors, make the accomplishment of the theoretically perfect impossible to attain.

So whatever degree of air superiority is postulated, there are and must be loopholes through which, in one way or another, some items must escape destruction which the air blockader would desire to destroy—for, as I have already said earlier in this series of articles, air blockade is withholding by the process of destruction. If, however, the process of air blockade is carried out on a sufficiently great scale, it must have the effect of minimising seriously, perhaps drastically, the capacity of the enemy so blockaded to continue to wage war with the thoroughness needed to achieve victory under modern conditions of warfare.

What Air Blockade Can Do

But air blockade can do more. It can affect the financial structure of the nation so strangulated in relation to its external trade. It does so because it destroys national assets at some of the sources of wealth creation. The true wealth of a nation is to be measured in its ability to transmute the raw materials of wealth into more costly forms by means of work and the application of brains to the processes involved. If the factories which comprise a considerable portion of the transmutative capacity of a nation are destroyed by air attack, part of the latent wealth as well as part of the capital wealth of the nation is destroyed, and its purchasing power abroad must be thereby affected.

This immediately suggests that there is a difference between the effects of air blockade attacks launched against the United Kingdom and those launched against Germany. For in all the countries now under German domination, some form of German paper currency can be employed to obtain, if need be by seizure, goods which were the property of the citizens or of the nation now overrun by German military power. By clever handling of the situation created by German domination, it is possible for the German Government to rob and despoil the nations now under German control by a system which appears to be legal and aboveboard, but which is in fact a paper swindle.

Within the orbit of her dominating military power Germany can thus obtain unlimited credit, with no real intention of settling the debt if she does not wish to do so; under such circumstances air blockade directed against Germany cannot affect her purchasing power within the countries she controls.

Therefore, to weaken Germany's military power in the shortest time, it is essential to attack objectives which are primarily of a military nature, and in the main to ignore those of a commercial character.

Great Britain, on the other hand, adhering to a system of purchasing which was the established system for the whole world until the three big Isms of Sovietism, Facism and Nazism, one after the other constructed their closed circuits of currency manipulation, is sensitive to the application of air blockade directed at her manufacturing sources of wealth and credit. So it must be expected that the Nazis will make raids upon targets which will cause people in Great Britain and elsewhere to exclaim that there was no military objective in the targets attacked. But surely it is a military objective to prevent the enemy from purchasing war material abroad? And if the Nazis can affect the foreign purchasing power which we are creating through our export trade, they will do so by means of air attacks irrespective of the military or non-military nature of the targets which they attack.

For this reason it is imperative that the employment of camouflage should not be confined solely to factories engaged directly upon war contracts. If there is any real value in camouflage (and in some cases there may be) its protective quality ought to be widely used to endeavour to minimise the asset-destroying process of the enemy air blockade attacks.

Incidentally, the best story of the recent raids that I have come across myself is this: A single raider dropped an incendiary bomb clean through the roof of a village institute. It fell on the billiards table burnt the baize cloth, of course, but the fine block of slate underneath made a perfect safety bed, on which it just fizzled out safely. And one of the local men who told me about it, said: "The bomb came clean through the roof. But nobody was hurt. They'd finished playing darts and all gone home."

The character of the German raids will continue to puzzle some people until they realise that the conduct of the air war upon the part of the enemy is derived from a different conception of air strategy. Their object must be to pin Great Britain down as the sole enemy for the time being and, while keeping her as the sole enemy for as long as may be possible, to utilise the power of air attack to damage her mobile strength in the air and at sea, largely by attacks against aerodromes and naval harbours and dockyards; to damage her foreign credit by attacks upon her general factories, and her military and air strength by attacks against special factory targets. Other objectives must be regarded as the German idea of the way to clear a road for a possible assault upon Great Britain; under this category must be included raids against isolated parts of the country, detached islands, and Eire.

To Gain Experience

It has also been suggested to me, and it would at least appear feasible, that some of the isolated raids which are made daily and nightly against the more remote parts of the country are possibly carried out by inexperienced crews or pilots who are despatched in this way to gain bombing experience. In other words, the suggestion is that the German training system includes the use of parts of the British Isles as a practice bombing range. The interrogation of some of the Nazi airmen prisoners might throw some light on this not-so-far-fetched explanation of apparent idiosyncrasies of the *Luftwaffe*.

If, however, the German air plan against Great Britain is of a generally destructive nature, regardless of distinction between what constitutes a direct military achievement and what does not, there can be no doubt that the British air blockade of Germany is of a more particular pattern.

The Royal Air Force is not yet so large that its efforts can be dissipated on unimportant targets. Its immediate objective must be concerned with the pre-

TARGET SELECTION FOR AIR BLOCKADE (CONTINUED)

vention of the accumulation of force which Germany would need to concentrate in certain areas before she could launch an attack against Great Britain. That can be accomplished not only by attacks against concentrations at strategic points, but by attacks against the lines of communication, by attacks against the stores dumps, against the oil depots, against the munitions factories. And these latter attacks have had the dual advantage that they are of a dual kind, being concerned with both immediate and long-term policy.

But with our still-too-small air force it is necessary to think in terms of the relative values of targets against which to direct those bombers we can employ against blockade targets as distinct from immediate military targets.

The past record of British bomb raids against German territory shows that the Air Staff have endeavoured to create the greatest widespread havoc throughout most of the important German industries which contribute directly to the whole German war machine's efficiency. But, because of this policy, which, of necessity, has had to run concurrently with the policy of military erosion of assembled forces, it has probably not been possible to do more than diminish the aggregate German strength by a small amount.

Concentration

It must be considered whether, when applying the power of a numerically inferior air force, it is not better to single out certain types of target and to concentrate entirely on such targets with a view to the elimination of certain specific requirements of the enemy.

But the employment of an air force to destroy one particular kind of industry may require raids to be made over widespread areas in the search for the series of factories which are engaged in it.

There are, of course, industries which might be brought to a standstill by the elimination of one essential section of the industry. A classic example is the destruction of the aero engine industry ; with that eliminated the output from airframe factories would soon come to a halt so far as useful aeroplanes were concerned ; for a time it might be possible to continue the output by utilising reserve engines held in store, but that method would not last long in wartime.

Reports do not indicate that the German aero engine industry has received enough attention at the hands of the R.A.F. And if an air force can be immobilised effectively by the elimination or the depletion of the output of the aero engine industry of the country, why waste time attacking two targets, the airframe industry target and the aero engine industry target? It is, of course, true that the wastage of airframes is high, but the wastage of engines (in these days of many multi-engined aircraft) must surely be higher still.

In Germany, as in Great Britain, the destruction of the aero industry would need a continuous series of widespread raids directed night after night (and perhaps day after day, which we cannot afford) until there was no doubt that the task had been accomplished.

What then would be the position of the aircraft industry of the country, be it Germany or Britain? Surely, in air attacks, as in other forms of warfare, the principle of concentration of force is important. But there is this difference : At sea, or on land, concentration of force requires the force to be assembled in one great array. Air attacks, on the other hand, may require only that the same target be attacked without intermission night after night to obtain the results which accrue to the fulfilment of the doctrine of concentration of force. In this aspect of air war the usual conception of speed of aircraft is reversed. It is the naval or the military concentration of force which requires the great array of force to be employed at a simultaneous moment in time. With the aeroplane the concentration of force can be applied as effectively, perhaps more effectively, by a continuous steady or increasing scale of attack against the same objectives.

Diminishing the Luftwaffe

It seems to me that the present policy of the British Air Staft may have the effect of diminishing the size of the German air force without diminishing the effectiveness of the part which remains. But this result is dependent upon an assumed, or known, inability upon the part of Germany to make good her losses in combat and action generally which result from the combined work of the Fighter Command and the Bomber Command. It may be that this will work out right in the long run. But the conception of war involved is the time-honoured one. And many time-honoured theories of war have gone by the board during recent months. Surely it is possible to do more with the bomber force at our disposal.

Surely there is a more direct way to cut at the heart of the air strength of all branches of Germany's military power simultaneously? The strength of a chain lies only in its weakest link. It has nothing to do with the length of the chain. Yet to-day the R.A.F. seems to be employed in chopping lengths off the German chain instead of searching for the weakest link and keeping on at that link without recession. It appears as though the R.A.F. method of attacking Germany by air is planned and plotted primarily by map reticulation, instead of by a planned systematic blow at the industrial organisation of the enemy, with the map serving merely as a subsequent guide as to the best means by which to apply the process.

Hitler has got where he is only by the employment of unorthodox procedure. There is no proof that the quickest way to defeat him is by the old orthodox professional system of planning. Notice that I say the *quickest* way to defeat him. The soldier isn't always concerned with the quickest way. There is a lot of procedure in professional soldiering. But what everyone in this country wants to-day is the man who has a short cut to victory. And, as things stand, the only arm of the Services which offers a short cut is the air arm. But it will not deliver the goods in this respect while its bombers are employed in a manner too orthodox.

It is not an easy problem. Berlin is a target which is an undeniable military target. Yet we had to wait until London was attacked before we attacked Berlin. We had to wait until we were single-handed against the dual Fascistry before we really began to attack Germany from the air.

Many Objectives

Berlin is a magnificent example of a mixed bag of objectives in one target. It falls into line with the general policy of attack which the Bomber Command have followed in attacking the enemy territory. Here are some of the military objectives in and around Berlin.

Aero engines ; H.E. and incendiary bombs ; autopilots ; night-flying equipment ; airframes ; machine tools (such firms as Loewe, Hasse Wrede, Stockwerk, all of

TARGET SELECTION FOR AIR BLOCKADE (CONTINUED)

whom have helped to fit out the shops of the British aircraft industry); arms and munitions; duralumin; uniforms; gas masks; gas shelters and anti-gas implements; tents and marquees; steel helmets; light and sound signals; calcium carbide; compressed air; R/T, W/T and blind-landing apparatus; telephones; cables; accumulators; machines for clothing and uniform industry; parachutes for personnel and for dropping mines and supplies; canned foods; training aircraft; aircraft repair and erection; airscrews; fire extinguishers; sights for A.A. guns; heavy road trucks for carrying troops; ropes; photographic material; bomb racks; aircraft parts; airscrew hubs; radiators; observer apparatus; oxygen apparatus; aero instruments; sighting and acoustic instruments; fire-fighting appliances against incendiary bombs; artificial smoke screens, as well as numerous public works contractors who specialise in road and bridge building, and a host of other details of manufacture which fit into the whole scheme of the German military and air machine.

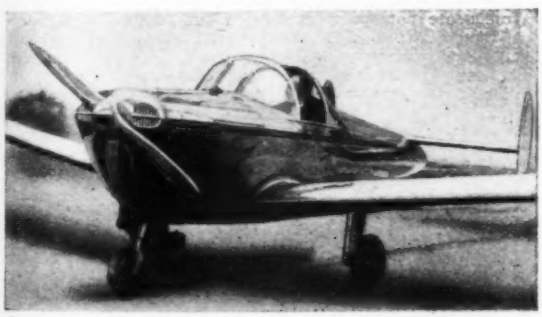
It would be tedious to recite a list of the names of the firms engaged. But there are some in and around Berlin whose significance will be grasped by the reader who has not as close a connection with the aircraft trade of Germany as have others. Among these are Siemens and Halske, whose works at Siemenstadt is a town in itself, Daimler-Benz, whose motors bring German aircraft over Britain almost hourly, Henschel, the great Kassel locomotive builders, who took up airframe building in 1935 outside Berlin, A.E.G., Bücker, who build elementary trainers, Heine airscrew manufacturer, Argus aero engines. Indeed, the Berlin of to-day is a great manufacturing centre for the German armed forces.

A TWO-CONTROL AMERICAN

Engineering and Research Corporation's Ercoupe

THE rather novel two-seater Ercoupe, which has ailerons, rudder and nosewheel all mechanically co-ordinated, has now reached the production stage, it is announced by the Engineering and Research Corporation of Riverdale, Maryland.

A side-by-side cabin aeroplane, the Ercoupe has twin fins and rudders and is powered with a single Continental A-65, rated at 65 h.p. at 2,300 r.p.m. It holds approved type certificate No. 718 from the Civil Aeronautics Board.



The makers claim that the Ercoupe will not spin, and the co-ordination of ailerons and rudder has been arranged so that they are both operated by turning the control wheel. This should make for easy piloting as, no doubt, will the nosewheel undercarriage. In fact, the claim is that only four hours' instruction is needed before going solo.

Use is to be made of the Ercoupe in an experiment in the Civil Pilot Training Programme. This aeroplane and the Stearman-Hammond—which is designed according to the same general ideas—will be used for the training of 60 pupils so that the claim as to whether these "simplified control" aircraft really simplify flying may be put to a proper test. Three groups of 20 will be trained at the Baltimore School of Aeronautics, the Brinckerhoff Flying Service (College Park, Maryland) and Palo Alto Airport, California.

The following technical particulars of the Ercoupe are given:—

Span	30ft.
Length	20ft.
Height	5ft. 11in.
Wing loading	7.9 lb./sq. ft.
Power loading	17.3 lb./h.p.
Empty weight	690 lb.
Disposable load	608 lb.
Gross loaded weight	1,125 lb.
Tankage	14 U.S. gals.
Maximum speed at sea level	110 m.p.h.
Landing speed	35.
Service ceiling	14,000ft.
Rate of climb	600 ft./min.

The wing section is of the NACA 43013 series and the centre plane is of aluminium alloy stressed skin. The main planes have a single spar of aluminium alloy and are fabric covered. The tail unit, of completely cantilever construction and with twin fins and rudders of very efficient looking design, is not fabric covered but is of stressed skin construction.

New Zealand Airmen Arrive

A LARGE contingent of New Zealand pilots, air gunners and airmen arrived in England on August 28 for service with the Royal Navy and Fleet Air Arm. They were welcomed by the High Commissioner for New Zealand, Mr. W. J. Jordan.

Airline Accident in U.S.A.

AN unfortunate accident occurred on August 31, when a Pennsylvania Central Airlines transport crashed in the Blue Ridge Mountains near Lovettsville, Virginia. All 21 passengers, including a senator, and the crew of four, were killed. The aeroplane was probably a Douglas DC3.

The accident occurred during a thunderstorm with the ground hidden by rain, and only ten minutes before it the pilot had reported that all was well. The precise cause of the accident is not yet known.

This is believed to be the first fatal accident in U.S.A. since March 26, 1939. One year later there was cause for much jubilation when the most extensive air transport system in the world completed 12 months' operation without one death, the first time such an achievement had been realised in the world.

Canadian Hurricanes

AN order for 600 Hawker Hurricanes has, it is reported, been placed with the Canadian Car and Foundry Company by the British Government. They will be built in the company's factory at Fort William, Ontario.

New U.S. Dive Bomber

KNOWN as the Curtiss XSB2C-1 (SB for "scout bomber," X for "experimental"), a new dive bomber for operation from carriers has been developed by the Curtiss-Wright Corporation. As might be expected, it is an all-metal low-wing monoplane. It is powered by a Wright Double-Row Cyclone 14, the take-off rating of which is 1,600 h.p., with 95 octane fuel.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

NATIONAL SAVINGS GROUPS

Blackburn Workers' Effort

WE note in your issue of August 1, the paragraph headed "Can you beat it?" referring to the National Savings Group of Brown Brothers, Ltd., and their Allied Companies. It is, of course, impossible to publish the number of employees of any firm, and without this figure the amount per person is unknown. Actually, we can beat the figure easily. During National Savings Week we ran a special compaign. A meeting was addressed by Miss Jean-Forbes Robertson, who was appearing in a local theatre that week. Valuable assistance was given by the Shop Stewards' Committee, and a prize scheme was operated. The works was placarded with posters, and a large "thermometer" was erected to show the daily increase in subscriptions. The works took considerable interest in bursting the bulb, and they did it with a good margin.

N. BILES,
Publicity Manager,
Blackburn Aircraft Limited.

CABLE LAUNCHING

Difficulties of Vehicle

YOUR correspondent, Mr. Sterling, asks rather humorously why the problem of assisted take-off cannot be solved quite simply by towing the aircraft up to flying speed by a vehicle of suitable power. The difficulty is in the design of the vehicle. In the first place the problem only arises for aircraft of high wing and power loading. For such aircraft the take-off speed will be high and the run very long. Assisted take-off would be employed to reduce the length of this run. In order to do this, the vehicle must have a thrust/weight ratio superior to that of the aircraft. Now even heavily loaded aircraft are already superior to most land vehicles in this respect, and Mr. Sterling would find that by the time he had added suitable gearing and transmission arrangements to his Merlins, that his final power-weight ratio was so little superior to the aircraft that he would have to add enormously to his power to get any appreciable accelerating effect. Most of this power would be absorbed in accelerating the vehicle itself.

The problem is not, however, insoluble. Airscrews might be employed instead of orthodox vehicle transmission. This would greatly reduce weight and the slipstream would contribute to the lift of the aircraft. In the opinion of the writer, however, the real field for assisted take-off lies in its application to the boat seaplane. Apart from the bomber and the long-range machines, land types suffer less from take-off limitations than from those imposed by landing. With the seaplane the position is reversed. Given smooth water and a strong enough hull there is no visible limit to landing speed, but in order to take-off, the hull has to be very large and of a form which is aerodynamically greatly inferior to the fuselage of a land machine. Assisted take-off would enable the boat hull to be as efficient as the fuselage and extend its already greater tolerance in respect of landing speeds. Such a machine would be more efficient than any land type because of the permissible higher wing-loading, while its structural simplicity, and absence of the complicated and expensive undercarriage, would render it cheaper in first cost and maintenance.

At risk of tiresome iteration, I repeat for the information of those chiefly concerned, that these aircraft would be less vulnerable to gunfire and might operate from bases substantially bomb-proof.

F. W. KING.

New Malden.

WOMEN FERRY PILOTS

A Strong Protest

ACCORDING to information received the number of women ferry pilots has now been increased to twenty. When the first appointments (8) of women to the job of ferrying machines were made it was stated that there were thousands of men capable of carrying out this work who were idle. Then, why employ women? If these capable men, who for months have been "rusting," are still idle, why have the number of women ferry pilots been increased?

When is this feminine invasion of men's jobs going to cease? Before the war there were 6,000,000 women engaged in professions, trades and occupations, while at the same time there were nearly 2,000,000 men idle. What a farcical position! What will be the position after the war? As one member of H.M. Forces wrote me: "Women are again taking this splendid opportunity to grab men's jobs. Are we men coming back to find our jobs all held by women?"

Women are now being trained as engineers, while, at the same time we have skilled men without work. The plight in which Britain found herself before the war was due in a great measure to the twenty years of feminism which has been sweeping the country since the last war.

I enclose a pamphlet, "The Feminine Invasion," and I shall be pleased to send a copy to any of your readers on receipt of a stamped (1d.) addressed envelope.

Feminism threatens the existence of the British Empire.

R. C. PINKERTON,
Hon. Sec. The National Men's Defence League.

Bristol, 1.

ON ITS LAWFUL OCCASIONS. A Sunderland flying boat of the type which did such good work at Tromsö, as described in this week's story of the "War in the Air"

HERE and THERE

British Order for Lockheeds

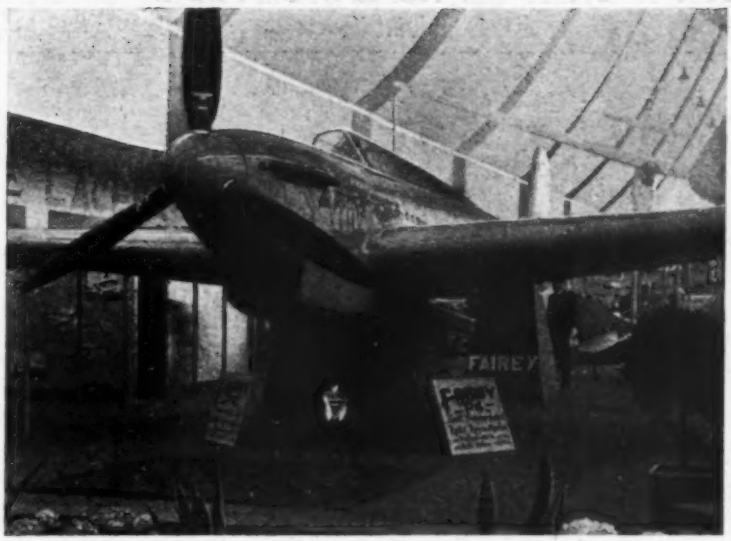
A LARGE order, stated to be 800, has been placed by Britain with the Lockheed Company for their twin-engined fighter designated the P-38. This is powered with two Allison V-12 liquid-cooled engines and is undoubtedly fast. But expectations that it will exceed 500 m.p.h. are thought to be far too extravagant. It is probably nearer 400 than 500 m.p.h.

"The Horseshoe Route"

BRITISH OVERSEAS AIRWAYS continue to run the Horseshoe Route from Durban to Egypt, India and Australia with unfailing regularity. About 300 of the staff who were formerly in England are now stationed in Durban and should soon be enjoying the surfing there. Others are on their way to the Gold Coast to prepare for the developments in the services which link the colonies in West and East Africa and will shorten the journey to the Far East and the Far South.

Pooling Air Transport

AFTER the invasion of the Low Countries it was suggested by a friend in one of the British air transport companies that there was much to be gained by pooling the commercial aircraft and maintenance resources of this country with those of Holland, Belgium and France. There was much to be gained and it has been gained, but where and how cannot be said—yet. Or, at any rate, not all of it. But the co-operation which Sabena have offered to us in Africa is most encouraging. So, too, is the agreement with K.L.M. for their landplanes to supplement our flying-boat services from this country to Lisbon. Our links with that strangely exciting capital, thronged with many nationalities, are at present more regular than seemed possible two months ago.



The Fairey P4/34 exhibited at the Brussels Aero Show last year has now been developed into the "Fulmar" and is to be used as a Fleet Fighter.

Two American Bees

AMONG the types of American aircraft inspected recently by H.R.H. the Duke of Kent, who is serving as a Group Captain in the R.A.F., were the little Brewster Navy Fighter described in *Flight* of August 8, and the Douglas DB-7 twin-engined light bomber. Both types are now being delivered to the R.A.F. in quantities. The Brewster will be known in the Service as the Buffalo, and the Douglas has been named the Boston. It may be recalled that the Buffalo was originally designed as a ship's fighter, but as it does not have folding wings it has, presumably, been deemed unsuitable for the Fleet Air Arm. The Douglas was illustrated in *Flight* of August 15. One of its most interesting features is the tricycle undercarriage. Some impressions of its handling characteristics were published in the same issue.

The Navy Buys British

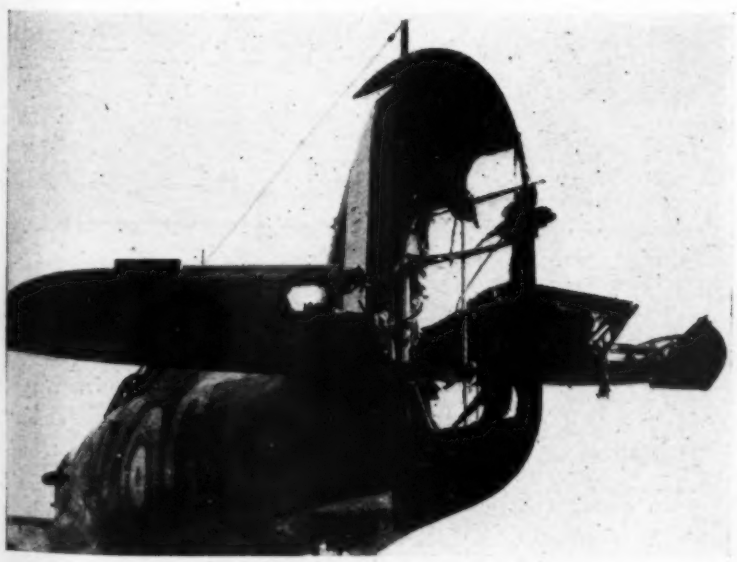
WHILE thus the R.A.F. is taking deliveries of American fighters originally intended for fleet work, it has been announced that the Fleet Air Arm is being equipped with a new two-seater fighter, the *Fulmar*. Actually a reference to this machine was made in the House of Commons many months ago. What is not generally known is that the *Fulmar* is a development of the Fairey P4/34.

The last time this machine appeared in public was at the Brussels Aero Show in July, 1939. It was there considered a two-seater fighter, and it may be recalled that Denmark had at that time ordered an eight-gun version. It does not, of course, follow that the *Fulmar* will be so equipped, but if it is, the machine will be the most powerful as well as the fastest type of its class in use by the Fleet Air Arm. As shown at Brussels the P4/34 was powered by the Rolls-Royce Merlin RM2Ms with two-speed blower.

Australian for Canada

AIR VICE-MARSHAL S. J. GOBLE, C.B.E., D.S.O., D.S.C., of the Royal Australian Air Force, has taken over duties in Canada as air liaison officer. He will be the Australian representative for technical administration of the British Commonwealth Air Training Plan.

Air Vice-Marshal Goble reached Canada on his second attempt, having been a passenger on the S.S. *Niagara* which sank after striking a mine shortly after leaving Australia. Rescued after spending eight hours in a lifeboat, he returned to Australia and sailed for Canada in another ship.



NEARLY TAILLESS. In spite of damage to rudder and elevator, this Hawker Hurricane was brought home safely by its pilot.

HERE AND THERE (CONTINUED)

Bombers by Air

BRITISH civil pilots, under the supervision of Captain A.S. Wilcockson, who was formerly Atlantic manager for Imperial Airways, have now commenced their task of delivering American and Canadian built bombers to England by flying them across the Atlantic. Neither the types nor the numbers have been divulged.

Towers for Radio Beams

THE use of ultra-high frequency for radio beams was pioneered in Australia and beams were installed on the air routes connecting Brisbane, Sydney, Melbourne, Hobart and Adelaide. They were first put into use about a year ago and the transmitting aerials, short metal rods, were mounted on steel towers. It has now been found necessary to use wooden towers as the steel affected the efficiency of the signals considerably, and the erection of the new towers is now proceeding.

Aero-Engine Orders in U.S.A.

PRATT AND WHITNEY have received a very large order for engines for the U.S. Army and Navy. The number is given as 17,000 and the cost is said to be £40,000,000. That makes the unit cost average £2,350. The size of the engines will no doubt be from 1,000 to 1,500 h.p.

The Wright Aeronautical Corporation also has received a similar order; this is for 20,000 engines. These orders represent about eighteen months or two years work for the firms.

Manufacture in Australia

LARGE orders have been given by the Commonwealth Government recently for aircraft which will be manufactured in Australia. The total order for Wirraways to be made by Commonwealth Aircraft Corporation now stands at 811, it is reported by *Aircraft*, another 496 having been added to the number. (The previous figure was made up of 82 for Australia and 233 ordered by Britain for the Empire Training Scheme.)

The same firm will also make 200 Wackett trainers to be powered with Warner Scarab engines made in U.S.A. An order has now been received for the light bomber-reconnaissance machine mentioned in a previous issue. Designed by the firm, this will have two locally built Pratt and Whitney Twin Wasps.

The order for Tiger Moths has been increased by 300, and efforts will be made to sub-contract them as much as possible. The De Havilland factory is reported to be making fuselages at the rate of one a day and their variable-pitch airscrew works are also in action. The manufacture of Bristol Beauforts by the Aircraft Construction Branch has struck some trouble over supply of duralumin, as all available sources seem to have been diverting their supplies to manufacture on this side of the world. This was an immediate consequence of the French collapse, but may have been straightened out by now by Britain releasing some of her American supplies to allow them to be sent to Australia.

Other troubles which the Beaufort Scheme has come up against are the diversion of engines and the non-delivery of jigs and tools from the Bristol company. The Bristol Taurus engines intended for the Beaufort are, quite rightly, not to be sent out from England since the need for them here is more urgent. Instead the Beauforts will be powered with Twin Wasps and the factory for their manufacture is now being built. To speed things up as much as possible, a preliminary order for Twin Wasps has been placed in America.

All jigs, tools and drawings together with ten sets of finished parts and raw materials sufficient for the first ten aeroplanes were to be sent out from the Bristol company. The start of the war prevented this and it has been necessary to make in Australia 27,000 out of the 33,000 jigs and tools needed. The Air Ministry have advised that the materials and finished parts will be sent as soon as practicable. It has been stated that the first airframe will be delivered early next year and that engine production will start in the first half of the year.

R.A.A.F. Buys Consolidateds

AUSTRALIA has ordered seven Consolidated PBY-5 amphibians for use by the Royal Australian Air Force. This nosewheel flying boat, known in its civil version without wheels as the Model 28, was described in *Flight* for February 8, page 114h, and its suitability to patrol work on the Australian coastline was pointed out. The Model 28 is powered by two Pratt and Whitney R-1830-S1C3G, rated at 1,050 h.p. at 2,550 r.p.m at 7,800ft. Take-off rating is 1,200 h.p. at 2,700 r.p.m. Maximum speed is given as 199 m.p.h. at 7,800ft.

Mr. Churchill's Tribute

THE Prime Minister has sent the following message to the Commander-in-Chief, Bomber Command:—

"The War Cabinet have asked me to congratulate the Bomber Squadrons who have been engaged in the recent long-distance attacks on military objectives in Germany and Italy.

"The fact that on the occasion of the first operations in the Berlin area, last Sunday week, the great majority of the pilots brought their bombs home rather than loose them under weather conditions which made it difficult to hit the precise military objectives prescribed in their orders, shows the high standard of poise and self-restraint preserved by the Royal Air Force in the performance of their dangerous duties.

"This is in marked contrast with the wanton cruelty exhibited by the German fliers, who, for example, have vented their spite upon the defenceless watering place and town of Ramsgate, in which nearly a thousand dwelling and shops, mostly of a modest character, have been wrecked.

"It is very satisfactory that so many tons of British bombs have been discharged with such precision in difficult conditions and at such great distances, and that so many important military objectives in Germany and Italy have been so sharply smitten.

"All this is another sign and proof that the command of the air is being gradually and painfully, but none the less remorselessly, wrested from the Nazi criminals who hoped by this means to terrorise and dominate European civilisation."

Edinburgh Man's Appointment

MR. JAMES TOCHER BAIN, an Edinburgh man, is superintendent of maintenance and overhaul for Trans-Canada Air Lines in Winnipeg. An R.A.F. man, he served seven years along the Mediterranean and in the Near East, and was mechanic in charge of the Schneider Trophy practice machine at Venice. Subsequently he served with the Scottish Motor Traction Co. and Spartan Aircraft, and was chief inspector and deputy chief engineer of British Airways before joining Trans-Canada. Among other qualifications, he holds a private pilot's licence.

One Year's Bag

THIS week the Air Ministry announced that during the first year of the war fighters of the R.A.F. shot down 1,752 German aircraft. Anti-aircraft guns accounted for another 196. In less than a month (from August 8 to September 2) 1,100 enemy aircraft have been destroyed. The R.A.F. has lost 314 machines in these operations, but 158 of the pilots are safe.

. . . of our pilots are safe : A Hurricane pilot comes back to earth via the Channel

SERVICE AVIATION

Royal Air Force Awards and Official Announcements

Age Limit Raised

IT has been decided to raise the age limit of R.A.F. pilots from 28 to 31.

This will open the service to a number of men already registered but who have not yet been called up.

Queen Wilhelmina's Birthday

MARIGOLDS—symbol of the House of Orange—were worn by officers and men of two squadrons of the Royal Dutch Naval Air Service which on Saturday of last week celebrated the 60th birthday of Queen Wilhelmina.

The squadrons are now operating with the Coastal Command of the R.A.F., and are engaged in the air protection of convoys and in reconnaissance work over the Atlantic.

Observer Corps

THE Secretary of State for Air has passed the following message to the Observer Corps:—

"The work of the Observer Corps, always exacting, becomes ever more arduous as the air fighting becomes more intense. In all weathers, night and day, you keep unceasing watch and by your vigilance and faithful devotion to your duty you are making an indispensable contribution to the achievements of our fighter pilots. Their victories are your victories too, so I send you this message of thanks and congratulations on your successful performance of the important task which has been entrusted to you."

Temporary R.N. Commissions

THE Secretary of the Admiralty desires to call the attention of boys leaving school, their parents and their masters, to the facilities for obtaining commissions in the Naval forces.

For all temporary commissions entry is to be made as a rating in the first instance except for categories such as Engineers for special qualifications.

For the Air Branch, boys of the age of 18½ and above may be earmarked for commissions prior to entry and subject to their successfully achieving the required standard at the end of their training. Full details can be obtained from the Secretary of the Admiralty (C.W.514), London, S.W.1.

Five Sergeants Decorated

ON Friday last, at an aerodrome in Kent, Air Vice-Marshal J. H. S. Tyssen, M.C., decorated five R.A.F. sergeants with the Distinguished Flying Medal. They were Sgts. L. S. Wyse, B. J. Brooks, G. H. Cooper, R. A. Latham and W. P. Whetton.

Sgt. Wyse has taken part in a number of flights against enemy targets. On his first trip to Amsterdam he took charge of his aircraft when the pilot was wounded in the leg and flew it part of the way to his base.

Sgt. Whetton, Sgt. Brooks, and Sgt. Cooper were observers in different aircraft engaged on reconnaissance over German-occupied territory. They showed determination and coolness under heavy enemy A.A. fire, and their skill in observation secured valuable results from the reconnaissances. Sgt. Brooks' aircraft was severely damaged in one of these operations and the air gunner was injured.

Sgt. Latham was decorated for outstanding initiative in the performance of his duty as air gunner on reconnaissance and survey flights in which his aircraft was exposed to severe fire.

Awards

THE King has been graciously pleased to approve the undermentioned appointment and awards in recognition of gallantry displayed in flying operations against the enemy:—

APPOINTED A COMPANION OF THE DISTINGUISHED SERVICE ORDER.

Act. Sqn. Ldr. M. N. Crossley, D.F.C. This officer has led his section, flight and squadron with skill and courage and has flown almost continuously since the commencement of hostilities. Since May, he has participated in engagements against the enemy over Holland, Belgium and France, including patrols over Dunkirk and St. Valery during the evacuation operations. Earlier this month he destroyed two Junkers 88 over Portsmouth and assisted in the destruction of another over Croydon. During the latter engagement he encountered another Junkers 88 and, having expended all his ammunition, acted as above guard until two of his section finally destroyed it. The next day he destroyed three enemy aircraft. Sqn. Ldr. Crossley has now destroyed a total of eighteen enemy aircraft and possibly another five.

DISTINGUISHED FLYING CROSS.

Act. Flt. Lt. P. W. Lynch-Blosse. Earlier this month this officer carried out a determined bombing attack against an aircraft factory at Bernburg. The first attack, owing to poor light, was not over the centre of the factory and, in spite of intense opposition, he decided not to bomb but to make a fresh attack. This was made and direct hits by all bombs were made on the main buildings which immediately commenced to burn furiously. Following aircraft were thereby enabled to locate and bomb the target.

Act. Flt. Lt. E. B. B. Smith. This officer has led his flight with great success; it has destroyed twenty-five enemy aircraft since June. One day in August, he led the flight almost to the French coast to attack two enemy aircraft which had set out to rescue a German pilot in the Channel. Despite strong opposition an enemy seaplane was damaged and, whilst on the return journey, another aircraft was attacked and damaged. The next day, he was involved in an attack by twelve or more Messerschmitt 109's. His aircraft was hit by two shells, damage being inflicted near the cockpit and petrol tanks. His aircraft eventually caught fire and, although he himself was enveloped in flames, he successfully abandoned his aircraft and was rescued about eight miles out to sea. Flt. Lt. Smith has now destroyed six enemy aircraft.

Act. Flt. Lt. J. T. Webster. Act. Flt. Lt. Webster has led his flight in innumerable offensive patrols during the latter part of the Dunkirk operations and during the intensive air fighting over the English Channel and Dover area in protection of shipping. With great skill and gallantry he has personally destroyed seven enemy aircraft and assisted in the destruction of two others. Early this month he and another pilot of his section engaged considerably superior numbers of enemy fighters. Three were destroyed by this officer. Not content with this, he also attacked an enemy motor torpedo boat with considerable success.

F/O J. B. W. Humpherson. This officer has led his section and on occasions his flight, with great skill. During operations in France, he destroyed two enemy aircraft and possibly another three. Since returning to England he has destroyed a further four enemy aircraft.

F/O. R. F. Smythe. In July this officer, whilst leading his section, broke up a formation of six Messerschmitt 109's near Folkestone, and succeeded in destroying one. F/O. Smythe has destroyed six enemy aircraft.

P/O. P. M. Gardner. During a short time in France this officer destroyed four enemy aircraft. Since returning to this country he has destroyed a further five enemy aircraft and possibly several others.

P/O. J. A. A. Gibson. In August, whilst on an offensive patrol over Dover this officer engaged and destroyed a Junkers 87 and was afterwards shot down himself. Although his aircraft was in flames he steered it away from the town of Folkestone and did not abandon the aircraft until it had descended to 1,000 feet. P/O. Gibson has destroyed eight enemy aircraft.

P/O. C. R. Hattersley. P/O. Hattersley was born at Kampala, Uganda, in 1914. He was educated at Streatham Grammar School and enlisted in an A.A. Battalion in 1930. He was promoted Lance-Coporal and Corporal successively, transferred to the R.A.F.V.R. and promoted a sergeant. He was granted a commission in 1938.

Act. Sqn. Ldr. J. D. D. Collier. One night in August this officer led a successful attack on an enemy oil refinery and storage tanks. After identifying the target, he carried out a low-level attack, obtaining direct hits which set the target ablaze. Intense fire from local defences was experienced, but these were eventually silenced by the explosion of the tanks and the gun positions became enveloped in flames. The target was completely destroyed. Earlier in the month, Act. Sqn. Ldr. Collier was the leader of the diversionary aircraft which carried out a low attack on a target and the defences in the vicinity. In spite of his aircraft having been hit in many places, this officer continued his attacks, until the main attack was completed. He has invariably displayed outstanding qualities of leadership, skill, courage and devotion to duty.

F/O. C. R. Davis. Flying Officer Davis has been engaged on operational flying since Sep-

Air Marshal W. A. Bishop, V.C., D.S.O., M.C., D.F.C., at an inspection of trainees at the Royal Canadian Air Force, No. 2 Initial Training School, at Regina.

PRITHIPAL SINGH, an Indian officer of the Royal Air Force, who wears a turban of blue material bearing the R.A.F. badge.

WHERE'S THAT SHOE HORN? An air-gunner lowering himself into the "dustbin" of a bomber.

tember 3, 1939. He has taken part in nearly all patrols and interceptions carried out by his squadron. He has been a section leader for the last two months, and on several occasions has led his flight. F/O. Davis has personally destroyed six enemy aircraft, and severely damaged several others. He has shown great keenness and courage.

F/O. A. Eyre. This officer has shot down seven enemy aircraft, and inflicted damage on several others. Whilst on service in France, he showed eagerness to fly on all occasions, and during the winter his flying times exceeded fifty hours monthly. During the evacuation from France, Flying Officer Eyre was entrusted with an important message from England to France, and successfully completed this mission, which required great coolness and presence of mind. He has at all times shown great devotion to duty.

F/O. R. M. Milne. Flying Officer Milne has personally destroyed seven enemy aircraft, and seriously damaged a number of others. He has led his section throughout with skill and courage, and has set an example to other members of the squadron.

P/O. J. E. Storrar. This officer took part in the intensive fighting over Dunkirk last May, and has since been engaged in numerous successful actions. His squadron was responsible for the destruction of twenty-one enemy aircraft in one day; he personally destroyed two of these. P/O. Storrar has displayed an unfailing desire to engage the enemy at all times and has shot down eight enemy aircraft.

P/O. A. N. C. Weir. This officer took part in the intensive fighting over Dunkirk last May, and has since played a highly successful part in numerous engagements over the Channel. Pilot Officer Weir has shown an intense desire to engage the enemy and has destroyed at least five enemy aircraft, three of these in the course of a single day.

Distinguished Flying Medal.

Sgt. E. Knowles. On two consecutive days in August, while captain of an aircraft on patrol over the North Sea, Sergeant Knowles encountered enemy naval forces. On each occasion he showed great skill, coolness and devotion to duty in reporting and shadowing these forces, and in carrying out determined bombing and machine-gun attacks in the face of heavy anti-aircraft fire. He only broke off the engagements when compelled to return to his base owing to lack of fuel. The accuracy and clarity of his reports enabled striking forces to be despatched to the attack. Since the outbreak of war he has carried out over five hundred hours' operational flying and has been engaged with the enemy on numerous occasions.

Sgt. C. Whitehead. Sergeant Whitehead has taken part in most of the patrols with his squadron since the outbreak of hostilities. He has personally destroyed four enemy aircraft, and probably three more. He has carried out his many tasks with enthusiasm, and has set an example by his courage and leadership.

Sgt. D. Windle. One night this month, P/O. Hattersley was the pilot and Sgt. Windle the navigator and bomb-aimer of an aircraft detailed to carry out a bombing attack on an aircraft factory at Dessau. Two reconnaissance runs were made over the target during which P/O. Hattersley carefully selected the most vital parts to attack. On the third run he descended to a low altitude, regardless of enemy fire, and enabled Sgt. Windle, by skilful bomb aiming, to obtain three direct hits which destroyed the main power house and severely damaged the assembly shops and the metal shop. The success of this operation, which lasted eight hours, was in no small measure due to the accurate navigation of Sgt. Windle and the determination, courage and skill displayed by P/O. Hattersley.

Sgt. G. Smythe. This airman pilot has personally destroyed five enemy aircraft and assisted in heavily damaging several others. On one occasion Sgt. Smythe engaged a Messerschmitt 109 over the Channel, and, after a considerable chase, he eventually shot it down whilst well inside enemy territory.

SERVICE AVIATION (CONTINUED)

Roll of Honour

Air Ministry Casualty Communique No. 44.

THE Air Ministry regrets to announce the following casualties on various dates. The next-of-kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—P/O. N. G. Bowen, 41984; A. Flt. Lt. S. D. P. Connors, D.F.C., 40349; P/O. J. A. J. Davey, 44182; Sgt. A. K. Dawson, 745180; Sgt. H. Dickinson, 523204; A. Flt. Lt. H. M. Ferriss, D.F.C., 40099; Sgt. B. H. Foster, 581328; P/O. C. H. Hight, 41924; A. Sgt. G. M. Hogan, 521035; P/O. D. Hutchins, 77938; P/O. J. T. Johnston, 43037; P/O. M. A. King, 42845; Sgt. D. I. Kirton, 550500; Sgt. C. Lee, 566470; Sqn. Ldr. T. G. Lowell-Gregg, 29244; P/O. J. G. Miller, 42865; Sgt. J. B. O'Brien, 550672; Sqn. Ldr. P. H. Rebbeck, 37421; Sgt. C. Stephens, 531100; Flt. Lt. G. E. B. Stoney, 28119; Sgt. L. P. Stubberfield, 751322; P/O. J. A. P. Studd, 41491; F/O. S. P. Swensen, 40328; Sgt. R. A. W. Tait, 751664; Sqn. Ldr. R. L. Wilkinson, 26192; Sgt. C. E. T. Wood, 638499.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "KILLED IN ACTION."—Sgt. J. Ballantyne, 580936; P/O. D. S. Carnegie, 77350; Sgt. J. R. Close, 653790; Sgt. A. McN. Cockburn, 638760; Sgt. J. W. Craig, 743022; Sgt. H. E. A. Craven, 542430; A. Wing. Cdr. N. D. Crockart, 32155; Flt. Lt. S. E. F. Curry, 37006; P/O. D. A. Drew, 79539; Sgt. J. K. Easton, 64007; Sgt. J. V. Futcher, 641321; Wing Cdr. J. H. Hargroves, 07128; Sgt. A. J. Harris, 534211; Sgt. A. G. Herbert, 749485; P/O. C. W. Howie, 77937; Sgt. J. B. Jones, 565170; Sqn. Ldr. L. S. Lawrence, D.F.C., 37409; Sgt. R. N. Lewis, 636576; Sgt. K. D. Macpherson, 615194; Sgt. R. T. Miller, 551536; P/O. G. H. Muirhead, 42632; Sgt. P. L. Nixon, 580671; Sgt. F. H. E. Phillips, 567099; Flt. Lt. A. L. Pitfield, 39007; P/O. B. A. Power, 75988; L.A/C. L. R. Reynolds, 550860; Sgt. S. E. Riddington, 751028; P/O. J. A. Rose, 42887; Sgt. K. R. Sellwood, 743306; Sgt. E. W. Smith, 566413; P/O. J. D. Smith, 42901; Sqn. Ldr. J. F. Stephens, 32024; P/O. M. R. Tagg, 42541; Sgt. J. Tansley, 633130; P/O. J. S. Torgalson, 42732; Sgt. D. G. J. Townsend, 580075; P/O. W. O. D. Tweddell, D.F.C., 40767; F/O. C. A. Wallis, 39180; Sgt. F. S. Waltho, 633350; Sgt. J. V. West, 533941; Sgt. F. J. B. Winch, 640278; Flt. Lt. L. C. B. Worthington-Wilmer, 25062.

WOUNDED OR INJURED IN ACTION.—F/O. R. E. P. Brooker, 39931; P/O. F. R. Carey, D.F.C., D.F.M., 43132; Sgt. J. Cowley, 565084; P/O. A. C. Culver, 43198; Sgt. O. A. Dupee, 700102; Sgt. B. G. D. Gardner, 740601; P/O. P. H. Hugo, D.F.C., 41848; Sgt. N. A. Lawrence, 740359; P/O. H. W. Moody, 81046; P/O. M. Negus, 33574; P/O. J. F. Pain, 43291; P/O. J. F. Soden, 42903; Flt. Sgt. B. J. Thomas, 56108.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. R. W. G. Beley, 43022; P/O. W. M. L. Fisk, 78092.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. W. Bland, 90895; F/O. A. G. Curtis, 36160; L.A/C. H. J. McElevay, 541082; Sgt. R. O'Donnell, 740193; Sgt. V. H. F. Witt, 564305.

MISSING.—Sgt. D. R. Aldom, 622419; A/C.1 W. Alston, 637973; Sgt. G. C. Ankers, 581136; Sgt. L. Armstrong, 561022; Sgt. A. S. Beeby, 629952; A/C.1 E. R. Biddle, 942880; Sgt. D. Blair, 742018; Sgt. A. E. Boland, 631257; P/O. M. S. H. C. Buchin, 81626; Cpl. G. C. Burdett, 520421; Sgt. T. P. J. Byrne, 755885; Sgt. A. N. Campion, 742698; P/O. D. E. S. Charles, 74349; Cpl. G. J. Church, 550645; L.A/C. E. C. Cowdery, 547793; Sgt. N. J. V. Cownie, 621848; P/O. T. J. Cranidge, 42947; F/O. E. R. Cuff, 43867; P/O. T. C. Cundill, 40680; Sgt. G. H. Easton, 751228; Sgt. O. R. Evans, 967877; P/O. M. J. Fisher, 80849; P/O. D. E. Gardener, 78461; P/O. I. T. H. Garson, 74667; A/C.2 A. W. Gilbert, 636979; P/O. M. H. Gillingham, 79180; F/O. H. M. Goodwin, 90269; Sgt. A. N. Gray, 581175; A. Sgt. H. W. W. Greenner, 504660; Sgt. W. Greenwood, 646676; P/O. E. R. Hale, 42219; Sgt. D. W. Halton, 748212; Sgt. F. B. Hawley, 748286; Cpl. A. F. C. Hooper, 351928; L.A/C. J. Hopkins, 358338; L.A/C. J. H. Jarvis, 506616; Sgn. Ldr. N. C. Jones, 33061; P/O. J. E. P. Laricheliere, 42849; Wing Cdr. E. C. de V. Lart, 05102; F/O. R. H. A. Lee, D.S.O., D.F.C., 33208; Cpl. N. F. M. Little, 246085; P/O. J. W. McKenzie, 43461; L.A/C. J. F. McMaster, 538667; Sgt. W. J. Q. Magrath, 581464; P/O. K. Manger, D.F.C., 70867; Sgt. E. K. Mellody, 969831; Cpl. S. Mills, 570908; P/O. C. R. Montgomery, 42421; Flt. Sgt. G. P. Moore, 510601; Cpl. L. P. Moore, 504845; Sgt. L. E. Moores, 653917; L.A/C. A. J. Moran, 623447; Sgt. A. F. Morrison, 965279; Sgt. R. McC. Morrison, 653323; Sgt. D. P. Morrisy, 580414; Sgt. K. W. Neaverson, 651567; Sgt. W. J. Neville, 741783; P/O. B. T. J. Newland, 42634; Sgt. K. Newton, 741543; Sgt. P. P. Norris, 740810; Sgt. R. G. Oliver, 581525; P/O. D. A. J. Parfitt, 42875; P/O. G. Parker, 42523; P/O. E. I. Parsons, 43370; Sgt. A. H. Patchett, 581296; Sgt. F. J. Pennicott, 653188; P/O. L. L. Pyman, 72586; P/O. J. B. Ramsay, 41204; A/C.2 G. W. Rook, 645027; P/O. N. D. Solomon, 79731; Sgt. D. F. Spencer, 580627; A/C.1 F. P. Steel, 900494; Sgt. P. B. Taylor, 581362; Sgt. W. B. Taylor, 652777; Flt. Sgt. J. D. T. Taylor-Gill, 590406; F/O. A. R. B. Tedder, 70666; A/C.1 C. J. Talford, 627498; A/C.2 J. K. Thompson, 614956; A/C.1 L. C. Thorpe, 633277; Sgt. C. E. Thrower, 751512; A. Sqn. Ldr. E. H. T. Thwaites, A.F.C., 37134; L.A/C. G. Troth, 62712; A/C.1 D. O. Tucker, 569789; Sgt. E. V. Turner, 903333; Sgt. K. V. Turner, 937492; Sgt. H. E. Tyldesley, 741308; A/C.1 R. I. Walker, 976642; Flt. Sgt. W. Ward, 358641; A. Flt. Lt. W. H. C. Warner, 90344; Sgt. E. Watson, 967923; L.A/C. E. E. Wheeler, 628716; L.A/C. V. J. White, 352129; P/O. C. W. Wigley, 79536; P/O. J. Wilk, 76932; Sgt. J. Young, 523927.

KILLED ON ACTIVE SERVICE (WHILE ENGAGED ON NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—A/C.2 B. Adams, 978577; Sgt. R. S. Aitchison, 748109; F/O. H. M. Aspen, 35328; A/C.2 R. E. Austin, 1350800; Cpl. G. Bage, 355733; P/O. H. G. Ballantyne, 36265; Sgt. J. Barlow, 901973; Sgt. H. H. Boulter, 781844; A/C.2 J. B. Brawley, 986486; A/C.2 J. P. Brereton, 997958; A/C.2 J. H. Brett, 928834; A/C.2 A. F. Brooker, 1168029; Sgt. D. W. Butler, 759247; Cpl. A. Cassely, 13633; L.A/C. C. H. Chilcott, 654152; Sgt. F. W. A. Collins, 742757; Sqn. Ldr. W. G. A. Coulson, 29237; A/C.2 S. Coutts, 981318; Sgt. D. B. Cowie, 645452; Cpl. S. A. Croker, 864272; Flt. Lt. R. S. Cromie, 90485; A/C.2 W. J. Crote, 1010974; P/O. A. P. Davis, 41261; Group Capt. E. P. M. Davis, 03211; A/C1 A. S. Daws, 752795; Cpl. G. Deely, 326721; W/O. E. F. Edwards, 336102; Sgt. E. Fitzgerald, 545600; Sgt. A. M. Froud, 637289; L.A/C. E. D. Giles, 922869; A/C.1 A. E. Grant, 861990; A/C.2 H. W. Hale, 956410; A/C.1 A. S. Happel, 611357; A/C.2 H. S. Heaves, 928835; A/C.2 A. V. Hedges, 928825; A/C.2 R. F. Hill, 956396; Cpl. R. W. Hollister, 511553; A/C.1 B. F. M. Holt, 645105; A/CW.2 M. H. Hudson, 882414; L.A/C. M. G. Hunkin, 533140; F/O. R. H. Immelman, 39530; A/C.2 M. E. Johns, 648365; Sgt. D. F. Jones, 970185; A/C.2 J. A. Jones, 951462; F/O. P. A. H. Lambart, 39635; Sqn. Ldr. L. De I. Leder, 11191; A/C.2 J. Leonard, 928164; Sqn. Ldr. J. H. Lowe, 33119; Cpl. E. B. McColl, 523177; A/C.1 J. McDonald, 659844; L.A/C. G. McElrea, 548268; P/O. R. B. Macgregor, 41856; F/O. N. S. Merrett, 90381; Sgt. F. Messent, 812073; Sgt. D. K. Mills, 525767; Sgt. A. Mitchley, 754174; P/O. A. D. Mountstephen, 79753; A/C.2 L. J. A. Munks, 928833; A/C.2 W. Neale, 812304; L/A/C. K. E. New, 567295; Sgt. S. T. Newcombe, 742084; L.A/C. R. O'Kelly, 569631; Sqn. Ldr. D. C. Oliver, 34109; Sgt. T. P. O'Rourke, 742804; Cpl. J. I. Price, 510925; Sgt. S. Robinson, 939668; P/O. J. O. L. Stephenson, 41623; A/C.1 N. H. T. Syme, 574864; A/C.2 A. Taylor, 951883; Cpl. H. Thorley, 809035; A/C.2 J. Tuohy, 1251644; P/O. R. W. Turnbull, 40577; L.A/C. B. Walton, 522713; Sgt. J. L. Whale, 742184; P/O. B. N. Whittle, 40871; A/C.2 B. Williams, 929009; L.A/C. K. Wilson, 809140; A/C.1 J. W. M. Windle, 752773; A/C.2 C. Wright, 636510.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. F. H. Appleby, 809044; A/C.2 V. C. Arnold, 640995; A/C.2 C. W. S. Barrett, 929105; A/C.2 L. F. Bush, 1252363; L.A/C. J. A. Beattie, 569548; A/C.2 C. W. Clarkson, 979269; Sgt. N. A. W. Dougall, 517145; A/C.1 N. McP. Dreyer, 611528; Sgt. J. Freeman, 44832; Cpl. W. J. Goodsell 350415; A/C.2 W. Gordon, 929176; L.A/C. L. G. H. Gould, 157531; A/C.2 R. Green, 160620; A/C.2 R. Hallams, 573806; A/C.2 L. Harris, 919160; A/C.2 J. H. Hood, 649841; A/C.2 J. A. Jones, 1353751; A/C.2 K. G. Jones, 952126; Sgt. J. H. Keats, 403293; A/C.1 J. Long, 39902; Sqn. Ldr. D. W. Lydall, 28091; A/C.2 P. E. Madigan, 622712; Cpl. D. Martin, 536441; L.A/C. J. Martindale, 617752; A/C.2 H. Mines, 641806; Cpl. C. V. Misstear, 543944; A/C.2 V. W. F. Mitchell, 639885; Sgt. M. W. Moss, 754679; Cpl. T. Norcott, 357276; P/O. C. B. North, 90629; A/C.2 C. O'Shea, 928934; Sgt. B. B. Parham, 347810; A/C.2 C. E. Phillips, 931064; Act. Flt. Lt. A. W. Ridler, 37639; A/C.2 C. Rogers, 1353744; A/C.2 W. Stephens, 1011891; A/C.2 D. J. Stubbs, 907923; A/C.2 W. G. Tickner, 929177; P/O. W. C. Timoney, 41536; Cpl. W. Walton, 547906; A/C.2 C. T. Watkins, 1257126; A/C.1 J. J. Westhead, 252405; L.A/C. J. L. Whittle, 540800; L.A/C. A. Williams, 569281.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.2 J. Anderson, 979309; L.A/C. B. Ash, 944309; A/C.1 E. G. Askew, 900240; A/C.2 N. Q. Charlton, 996363; A/C.2 E. Crossley, 973446; A/C.1 A. M. Langdon, 630191; P/O. J. T. Wardlaw, 42920.

PREVIOUSLY REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. B. J. R. Brady, 90403.

DIED ON ACTIVE SERVICE.—A/C.1. J. Allison, 871535; L.A/C. A. E. K. Briggs, 642145; A/C.2 S. Butcher, 625848; A/C.2 A. R. Emberson, 929202; A/C.2 E. W. May, 638822; A/C.1 E. T. Robinson, 840221; A/C.2. W. J. Sing, 908671; Sgt. T. R. Timewell, 346541; A/C.1. J. J. Walker, 985326; A/C.2. D. V. Wright, 580881.

PREVIOUSLY REPORTED WOUNDED OR INJURED IN ACTION, NOW REPORTED PRISONER OF WAR.—L.A/C. C. E. Coote, 549667.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED PRISONER OF WAR.—Act. Flt. Lt. L. F. Gregory, 37598.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. C. Bowman, 77927; Sgt. R. W. Cornwell, 747814; Sgt. V. A. Coveyduck, 580711; Sgt. A. Cross, 534022; P/O. A. H. Deacon, 41906; P/O. R. H. Edwards,

SERVICE AVIATION (CONTINUED)

42113; L.A/C. T. Greenall, 530967; Sgt. R. E. Hotchkiss, 653176; P/O. T. C. Jackson, 90754; F/O. F. W. S. Keighley, 70772; Sgt. J. W. H. Parsons, 563997; P/O. J. L. Scott, 42728.

Royal Australian Air Force

PREVIOUSLY REPORTED WOUNDED OR INJURED IN ACTION, NOW REPORTED WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. G. H. Booth, 2743.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Act. Flt. Sgt. R. A. J. Anderson, 36139.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. H. G. Miller, A.39929.

R.A.F. Casualties in H.M.S. Glorious

KILLED.

Cpl. C. J. Bollapd Flt. Sgt. G. T. Jones; A.C.1 T. J. Kelly; Sgt. H. T. Heathley; A.C.1 B. C. Waters.

MISSING.

Cpl. H. F. Bond; A.C.1 P. B. Brindley; A.C.2 T. P. Brown; Flt. Sgt. F. E. Dennis; A.C.1 F. Dixon; Flt. Sgt. W. J. Downer; Cpl. L. F. Finch; A.C.1 M. B. Forsyth; A.C.1 J. H. Foulds; Cpl. R. A. C. Garrett; A.C.1 W. J. G. Gordon; Flt. Sgt. J. F. Gorton; L.A/C. F. Green; Cpl. R. A. E. Green; Cpl. B. J. Griffiths; Sgt. W. E. Harris; A.C.1 D. H. Hellier; Sgt. L. G. Hills, F.A.E.; L.A/C. S. Janes; A.C.1 J. J. Kavanagh; Flt. Sgt. G. Lowden; L.A/C. J. E. Maw; L.A/C. R. H. Neale; Cpl. J. J. Parsons; A.C.1 S. Parsons; Cpl. R. Pears; Cpl. K. H. Percival; A.C.1 E. C. Reed; L.A/C. T. Rees; A.C.1 J. J. V. Simpson; L.A/C. J. A. Spence; L.A/C. R. Stevenson; L.A/C. A. Stewart; L.A/C. C. Thomas; L.A/C. A. E. Wise; A.C.2 E. Withers

Prisoners of War

FOLLOWING is the latest list of British Prisoners of War in enemy hands, as received from a German source:—F/O. R. C. D. McKenzie, Christchurch, New Zealand; Sub. Lt. J. T. Nicholson, Stockport; P/O. M. J. Fisher, Reading; Sgt. N. J. V. Colney, London, S.W.6; Sqn. Ldr. Thwaites, address unknown (wounded); P/O. Charles, address unknown (wounded); Sgt. Pennycot, address unknown (wounded); P/O. R. Roberts, Sheffield; Sgt. Perritt, address unknown (wounded); Sgt. F. J. C. Brown, Addington, Surrey; Sgt. A. Sunderville, Newcastle; Sgt. H. Bradley, Leeds; Sgt. E. Holmes, Ilkeley; F/O. P. Whitley, Air Ministry, London; F/O. W. Nixon, c/o Lloyds Bank, London; Sgt. A. Kelmick, Surbiton, Surrey; Sgt. J. Kerline (phonetically), Peacetown, Notts (?); Sgt. H. Martin, Leigh-on-Sea; P/O. P. Cook, Lee-on-Solent; Sgt. J. Stewart, Derwent, Scotland; Sgt. S. Harrison, West Wickham, Kent.

P/O. C. O. Johnson, Hamilton, New Zealand; P/O. P. Frowley, Cricklewood, London; Sgt. G. White, Wantchester Park, Surrey; Sgt. W. Kellup, Farnham, Surrey; Sgt. R. Entwhistle, Birkenhead, Cheshire; Sgt. A. Stevenson, Ashenden; Lt. C. Filmer (? Pilmer), East Molesey, Surrey.

Royal Air Force

General Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Warrant Officer: (Aug. 9, Sen. July 30) R. T. Bradshaw. Flight Sergeants: (Aug. 6, Sen. July 30) F. W. Otter; (Aug 7, Sen. July 30) W. P. Boyd. Sergeants: (July 15, Sen. May 2) J. N. Owen; (Aug. 1, Sen. July 30) R. M. H. Ross; (Aug. 8, Sen. July 30) E. Pullen; (Aug. 12, Sen. Aug. 8) W. J. F. Barrett, P. Earle, G. J. Trigger.

The undermentioned Act. Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—(May 18) J. D. Towlson; (July 27) P. R. Turgel.

The undermentioned Act. Pilot Officers on probation are graded as Pilot Officers on probation:—(July 13) P. S. Daily; (July 27th) J. Hurry, J. C. Dale, K. E. Hughes.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(April 16) R. G. Hurst;; (April 26) P. R. Walker, D.F.C.; (May 6) F. M. Milligan; (June 19) H. E. Bufton; (July 21) J. Compton; (July 25) D. J. Bassett; (July 27) W. G. Oldbury, W. C. S. A. G. Cooper, L. G. Hamer; (July 28th) V. S. Butler.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—(Jan. 10) P. A. L. Farrell; (June 27) J. C. R. Brown; (July 6) C. G. Christophers, J. Chamberlain; (July 17) A. S. McCracken, R. Hudingham, D. L. Cartridge; (July 25) N. D. Lancaster, A. W. Charrett, A. R. Watson, J. M. Hillier, R. C. Ferguson, A. G. C. Mackan.

A.V.M. A. G. R. Garrod, O.B.E., M.C., D.F.C., is granted the acting rank of Air Marshall (July 8).

P/O on probation R. Scott is transferred to the Administrative and Special Duties Branch (Aug. 17).

Flt. Lt. M. P. C Corkery is seconded for special duty (Aug. 12).

The undermentioned Flying Officers relinquish the acting rank of Flight Lieutenants on the dates stated:—(April 20) L. D. Wilson (since promoted); (June 20) J. A. F. Mertens; (Aug. 5) M. R. Atkinson.

The short service commission of Act. P/O on probation W. A. L. White is terminated on cessation of duty (Aug. 20).

Errata.

In the *Gazette* of July 23, notification concerning W/O. C. W. Francis. *For* Pilot Officer on probation *read* Flying Officer.

Technical Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation:—Warrant Officers: (June 5, Sen. May 9) S. C. Mounsey; (June 19, Sen. May 9) J. Davis; (June 27, Sen. May 9) C. Harvey; July 1, Sen. May 9) H. Wilson; (July 31, Sen. March 14) G. M. Somers.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Flight Sergeants: (June 6, Sen. May 30) T. C. Pratley; (June 12, Sen. May 16) A. T. Ingram.

THE MODERN NAVY: Fleet Air Arm gunners receive instruction with a Boulton Paul Turret Practice Trolley.

Sgt. J. E. Barber is granted a commission for the duration of hostilities as Act. Pilot Officer on probation (Aug. 7, Sen. June 20).

The undermentioned Squadron Leaders are promoted to the temporary rank of Wing Commander (June 1, 1940):—J. C. Stevens; A. E. Groom, M.B.E., A.F.C., D.S.M.

Erratum.

In the *Gazette* of July 30. *For* Arthur James Chapman read Frederick Arthur James Chapman.

Administrative and Special Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation:—Warrant Officers: (June 11, Sen. May 2) A. Houghton; (June 21, Sen. May 2), G. T. Block; (July 20, Sen. April 25) W. H. Turner; (July 27, Sen. May 22), W. H. North; (July 29, Sen. July 15) H. S. Edwards; (July 30, Sen. July 22) A. E. Bishop, M.M.; (Aug. 3, Sen. July 22) H. K. Jones; (Aug. 5, Sen. July 22) E. Dodd; (Aug 6, Sen. July 10) H. Dukes; (Aug. 6, Sen. July 24th) T. Hawker; (Aug 9, Sen. July 22) C. F. J. Pope.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Warrant Officers: (July 27, Sen. July 12) G. K. Dean; (July 27, Sen. July 15) D. G. Foreman; (Aug. 1, Sen. July 16th) W. Allen; (Aug. 7, Sen. July 19) H. P. Brown. Flight Sergeants: (Aug 5, Sen. June 20) R. S. Kirby; (Aug. 5, Sen. July 1) W. Cunniffe; (Aug. 9, Sen. July 12) F. W. A. Flanigan;; (Aug. 11, Sen. July 29) R. C. Frogbrooke. Sergeants: (July 31, Sen. July 12) F. D. Northfield; (Aug. 4) C. E. Beer; (Aug. 5, Sen. July 1) H. R. Bunn.

Flt. Sgt. W. Cox is granted a commission for the duration of hostilities as Act. Pilot Officer on probation (July 26, sen. June 20).

Erratum.

In the *Gazette* of Aug. 13. Notification concerning Flt. Sgt. Mitchell, *for* Ernest *read* Edward.

Equipment Branch.

The undermentioned Warrant Officers are granted commissions for the duration of hostilities as Flying Officers on probation:—(June 17, Sen. May 2) W. H. Dean; (July 29, Sen., Feb. 29) R. H. Banham.

Flt. Sgt. H. A. Maddock is granted a commission for the duration of hostilities as Pilot Officer on probation July 10, Sen. May 2).

The undermentioned Pilot Officers on probation are confirmed in their appointments:—(April 3) R. H. F. Wells; (May 1) G. B. Broadway, N. E. De Gruchy; (July 26) C. W. Lovatt.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer:—(July 3) E. G. F. Hill, R. H. F. Wells, R. Willoughby, F. J. C. Crane, J. M. Horner, G. N. Street, W. D. Ingram, J. R. Fisher; (July 17) E. E. W. Brace, A. J. Impleton, D. J. Walliker; (July 26) C. W. Lovatt; (July 31) E. C. Carson, N. E. De Gruchy.

Sqn Ldr. A. T. Wells is placed on the retired list on account of ill-health (Aug. 25).

Accountant Branch.

The undermentioned Warrant Officers are granted commissions for the duration of hostilities as Flying Officers on probation (June 21, 1940, sen. June 6) W. Robertson; W. J. Silcox.

Act. W/O. H. Dribbell is granted a commission for the duration of hostilities as Pilot Officer on probation (July 6 (sen June 6.)

The undermentioned Pilot Officers are confirmed in their appointments:—(April 17) T. Alderson, F. E. Crosland, J. H. C. Russell, R. J. Sharples, W. B. H. Vidgeon, R. D. White; (June 10) A. F. Bacon, D. L. R. Brown, D. C. King, J. Mark, L. D. Vickery, J. F. Wilson.

The undermentioned Pilot Officers are promoted to the rank of Flying Officers:—(June 1) W. B. H. Vidgeon, R. D. White (July 31) D. L. R. Brown, D. C. King, J. Mark, J. F. Wilson.

Medical Branch.

W/O. F. L. Jenkins is granted a commission for the duration of hostilities as Quartermaster and Flying Officer on probation (Aug. 1, sen. June 20).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

Flt. Lt. W. E. B. Dowling is granted the rank of Squadron Leader (July 29).

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept 3, 1939) A. M. Glover, H. V. L'Amy; (Feb. 4) P. W. A Dudgeon, D.F.C.; (June 28) C. H. E. Coles.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer:—(Mar. 23) W. H. A. Wright; (June 14) D. H. G. Tollemache; (July 15) F. H. Butcher; (July 17) J. R. B. Hartnoll, W. R. Hole, J. L. Kemp, R. A. Marsh, G. W. Stanhope, J. C. M. Wilson, M. D. H. Wilson.

Flt. Lt. J. Harston is transferred to the Administrative and Special Duties Branch (Aug. 15).

F/O. F. W. Moss resigns his commission (Aug. 6).

Royal Air Force Volunteer Reserve

General Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—(Aug. 6) V. J. Somerset-Thomas. Sergeants: (May 26) C. A. C. Chetham; (June 18, Sen. April 28) R. A. Smith; (July 13, Sen. July 11) W. D. Mackenzie. (Substituted for notification in the *Gazette* of Aug. 13 concerning this officer.); July 27, Sen. May 2) A. Spooner: (July

SERVICE AVIATION (CONTINUED)

27, Sen. July 21) R. S. Cooper, C. E. Pearson, J. D. Royal; (Aug. 1, Sen. July 30) E. H. Jones; (Aug. 3) R. A. Kings; (Aug. 5, Sen. July 21) K. Matthews; (Aug. 5, Sen. July 30) O. C. Chave; (Aug. 7, Sen. July 30) R. Hicks; (Aug. 11, Sen. July 30) T. Stevenson. Leading Aircraftmen: (July 28) R. C. Mordaunt, R. L. Prattle, E. R. Templer, A. E. C. Derrett, G. R. Humphries, A. A. Morgan, L. A. Naylor, C. G. Reeve, W. C. Taffender, L. J. Tait.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation (June 22, Sen. May 26):—Sergeants: E. Albon, C. T. Campbell, J. H. Cloete, W. McG. Cooper, G. D. Cox, R. A. Mackie, S. H. Miller, P. A. Newton, J. A. G. Parker, J. Pringle-Wood, P. H. S. Simmonds, I. T. G. Stewart, J. Stidolph, J. G. D. Strange, W. Treger, A. Wilson, L. K. S. Wilson. (Substituted for notification concerning these officers in the *Gazette* of July 16.)

The undermentioned are granted commissions for the duration of hostilities as Act. Pilot Officers on probation:—(May 27) S. Body; (July 26) W. Beckingham, W. E. Blench, L. J. Cheney, A. H. Collins, E. D. Comber-Higgs, W. H. Corbett, G. J. L. Crabb, E. A. Dare, E. W. Donati, J. Ensel, W. Esplen, C. L. Evans; L. F. Evans; A. H. C. Gibson, E. S. Hale, F. F. Harrison, F. C. Joerin, D. S. S. Low, W. B. Matthews, M. I. A. Mendoza, F. A. Montford, C. D. Owen, F. E. Pratt, C. D. Ramsay, N. Ruck, H. Schaverien, A. Sharples, N. R. Shuttleworth, L. E. Small, H. Storry, C. W. Street, F. W. O. Street-Porter, L. C. Sutton, E. H. Tomlinson, F. W. Turner, R. Van Den Bok, T. Wewege-Smith, L. G. Wrentmore.

P/O. on probation E. T. Halley is confirmed in his appointment (March 29).

The undermentioned Act. Pilot Officers on probation are graded as Pilot Officers on probation:—(April 29) T. P. K. Scade; (June 29) J. H. F. Ford; (July 13) G. P. W. Austin, R. G. Whitehead, W. M. L. Fiske.

The undermentioned are transferred to the Administrative and Special Duties Branch:—(July 1) P/O. R. W. King; (July 20) P/O. on probation R. F. Walker.

P/O. D. G. Ashton takes rank and precedence as if his appointment as Pilot Officer bore date February 10. Reduction to take effect from July 30.

P/O. J. E. Rylands resigns his commission (August 14).

Errata

In the *Gazette* of July 9. Notification concerning L.A/C. Thomas, *for* Thomas Frederick Victor, *read* Frederick Victor.

In the *Gazette* of August 6. Notification concerning Sgt. Smith, *for* Garham *read* Graham.

Technical Branch.

L.A/C. W. G. Pyke is granted a commission for the duration of hostilities as Pilot Officer on probation (August 8, Sen. July 31).

Balloon Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Corporals: (July 23, Sen. July 17) C. G. Baron, R. P. Edmonds, E. Kershaw, M.C.; (July 23, Sen. July 18) R. A. Green, P. C. Stone. Leading Aircraftman: (August 6, Sen. July 29) W. O. Rollo. Aircraftman 1st Class: (July 25, Sen. July 18) F. G. Roberts.

Errata.

In the *Gazette* of August 6, 1940. Notification concerning C. L. D. Guy. *For* July 15 *read* June 27.

Administrative and Special Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—(March 5) D. F. Grierson; (April 9) N. B. Sherwell; (May 22) W. S. Huxley; (May 25) H. J. Smith; (May 28) E. C. Hodges; (May 30) H. J. Mills, A. D. P. Thomas; (May 28) R. H. Thomas, C.S.I., D.S.O.; (June 2) G. Sweeting; (June 9) M. ap S. Roberts; (June 17) T. H. Gould; (June 19) A. H. C. Score; (June 21) A. D. Knight; (June 24) G. C. Robinson, R. Ellis; (June 25) C. F. Clarke, J. Shotter; (June 26) C. Skelton; (June 28) A. H. E. Rogers; (June 29) P. Edgar, W. H. Green, G. W. Provan; (June 30) J. S. Porteous, C. W. Price, F. Wharton; (July 1) F. P. Duck, V. J. Fishley, J. T. Leader, E. Lowndes, H. May, H. Parker, N. M. Pearson, A. Sutherland, N. G. Wright; (July 2) K. Anderson, H. W. Aston, H. Champion de Crespigny, A. C. Churchill, T. B. Olive, M.C., H. A. Webb, A. Woodhead, G. Gordon Williams, Lord N. G. H. Alington; (July 3) E. C. Williams, M.C.; (July 4) T. F. S. Burridge, W. H. Ricardo, F. Waterhouse; (July 5) J. C. Barrack, E. V. Mayer; (July 6) R. Heymann, R. G. C. Horsley; (July 7) J. F. Fogo; (July 8) G. R. Crowther, F. Eaves, D.S.O., C. J. Nurse, E. H. Dunn; (July 10) A. Jenkyn-Jones; (July 12) S. E. Schofield; (July 15) J. J. S. Ellis; (July 16) P. M. Heffernan, T. Linnell; (July 17) E. L. Tottenham; (July 18) M. G. W. Stewart, D.F.C.; (July 19) F. S. Cannell, D. Guye, J. C. Maclennan, H. Simpson; (July 20) S. L. Price; (July 21) A. E. Somers, A. H. M. Stayner; (July 22) E. O. Collcutt, J. H. E. Curling, E. B. Harmer, S. B. Jones, M. D. Morrissey, E. P. Nicholls, A. P. Strange; (July 23) H. E. Collier, W. J. Luxton, J. W. Harris, J. E. Kidman, T. Magner, F. P. St. Maur; (July 24) E. Gordon-Davis, N. D. Howard, D. C. Richardson, C. B. Oxberry; (July 25) H. P. Chaplin; (July 26) F. Adams, R. O. Bennett, W. G. Charles, B. W. Clarke, M. E. Colgan, S. R. Connor, F. V. Copperwheat, S. Davies, J. Dolby, A. L. Dunstan, I. S. Edwards, D. C. Ellis, R. B. Forman, J. Francombe, P. J. Gouldson, J. V. Healy, E. G. Huntley, G. T. Kelsey, A. B. Laithwaite, E. Lavington, A. R. Macmillan, D. F. Macrae, P. T. A. McClure, D. McLeod, B. W. Mulrenan, D. Nicholson, J. F. Parsons, T. A. Radge, E. W. Ratcliffe, J. N. Shaw, D. Stewart, T. Taylor, L. F. W. Thompson, A. K. Webb, F. Williams, A. Young; (July 27) D. G. Carter; (July 29) A. K. Allen, T. H. Nichols, E. A. A. Shackleton, G. T. Johns; (July 31) G. H. M. Standing; (August 1) L. T. Baxter, D. Cairns, M.B.E., H. W. Langbein, S. R. Painter, R. R. Rochat; (August 2), M. R. Haseler, G. W. V. Revington, F. J. A. Tanner; (August 3) H. G. Donald; (August 5) A. J. van E. Addis, H. H. Apted, H. T. Bird, G. H. Bond, H. L. Ellis, A. J. C. Hoskyns-Abrahall, W. F. Longley, G. H. Roberts, H. A. Thirkell; (August 6) G. Bowers, G. C. Challis, C. E. P. Davies, R. M. Dewey, C. L. Evans, M.C., H. G. E. Greville, C. K. Howard, L. B. Hudson, A. G. McCulloch, E. Rhodes, E. H. Weatherall; (August 7) R. W. Brayne, H. J. Eley, B. A. L. Maltby, T. Oliphant, A. A. Reid-Jamieson, E. W. Roythorne; (August 8) G. T. Bridgewater, A. J. W. Giles, B. Howden, E. H. Sharp, A. R. Watson. Flight Sergeant: (July 22, Sen. June 26) F. T. Honey. Sergeants: (July 23, Sen. July 4) A. P. Harrison; (August 2, Sen. June 20) W. L. H. Thring. Corporal: (August 9, Sen. July 24) J. M. Desborough. Aircraftmen 2nd Class: (July 30, Sen. July 16) K. U. Blinkworth; (August 5, Sen. July 24) C. P. Zorab.

Sgt. C. Bartlett is granted a commission for the duration of hostilities as Act. Pilot Officer on probation (July 22, Sen. June 20).

Act. P/O. on probation F. A. Blackmon is graded as Pilot Officer on probation (April 1).

P/O. on probation G. G. Elliot is transferred to the General Duties Branch (July 10).

The undermentioned relinquish their commissions on account of ill-health:—(June 11) F/O. W. F. Foulston; (July 9) P/O. on probation D. C. Macdonald.

The undermentioned Hon. Pilot Officers relinquish their Hon. Commissions on cessation of duty (August 20):—A. L. Hunt, E. J. Stevens.

F/O. T. G. Simpson resigns his commission (August 8).

The commission of P/O. on probation R. D. L. Humbert is terminated on cessation of duty (July 15). (Substituted for notification in the *Gazette* of July 2.)

Flt. Lt. D. S. F. E. Maule-Cole is dismissed the service by sentence of General Court Martial (August 14).

Erratum.

In the Gazette of July 16. Notification concerning P/O. Rippon. *For* July 6 *read* July 16.

Equipment Branch.

L.A/C. R. Beckton is granted a commission for the duration of hostilities as Act. Pilot Officer on probation (August 3, Sen. May 2).

P/O. A. W. Low is promoted to the rank of Flying Officer (July 17).

P/O. on probation P. A. McEachern is transferred to the Administrative and Special Duties Branch (August 20).

Accountant Branch.

The undermentioned Act. Pilot Officers on probation are graded as Pilot Officer on probation:—(June 11) H. M. Tiller; (June 21) J. A. B. Boyd, J. Fry; (June 22) R. A. Adair; (June 28) G. J. H. Horne, E. W. B. Lewis; (July 3) R. E. Wood; (July 4) W. L. Rowland; (July 9) D. T. Walker.

P/O. on probation W. W. Fea resigns his commission (August 17).

Dental Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers:—(August 3) F. G. H. Thornton, L.D.S.; (August 6) W. McK. Bowler, L.D.S.; A. N. Leicester, B.D.S.; D. M. Sanders, L.D.S.; A. H. G. Trevanion, L.D.S.

Chaplains Branch.

The undermentioned are granted commissions for the duration of hostilities with the relative rank of Squadron Leader:—(August 1) The Rev. C. H. Perry, B.Sc.; (August 15) The Rev. D. M. Harper, The Rev. C. S. Day, The Rev. H. J. White, M.M.

Auxiliary Air Force

General Duties Branch.

C. M. Elgar is granted a commission as Asst. P/O. on probation for five years (June 8).

The undermentioned Act. Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers:—(June 2) P. B. Doorly; (June 29) R. P. Drummond; (July 13) L. E. Stannard, K. R. Aldridge, A. J. J. Truran, J. A. P. McClintock, P. G. H. Pearson, G. Buckley, P. Wilson, L. MacKintosh; (July 14) G. N. Gaunt; (July 20) C. J. Mackenzie; (July 27) M. G. Pascalis.

Women's Auxiliary Air Force

The undermentioned are appointed Assistant Section Officers on the dates stated:—(August 5) Mrs. M. Z. Pain; (August 17) Cpl. Miss F. M. Bemrose, Sgt. Miss K. M. Bibby; A/CW.1 Miss D. G. Botting, A/CW.2 Miss D. G. B. Thomas, A/CW.2 Miss M. M. Clayton, A/CW.2 Miss M. H. J. Collier, A/CW.1 Miss V. M. Cooper, A/CW.1 Miss E. M. Corkill, A/CW.1 Miss J. H. Craw, A/CW.1 Miss V. Gwynne-James, A/CW.1 Miss S. MacG. Hamilton, A/CW.2 Miss G. Henderson-Howe, A/CW.1 Miss J. E. Legge, A/CW.1 Miss B. C. Lightfoot, Sgt. Miss J. E. Marks, A/CW.1 Miss A. R. Middleton, A/CW.2 Miss D. H. Nightingale, A/CW.1 Miss E. Pen-Symons, A/CW.1 Miss J. Pipon, A/CW.1 Miss A. L. Power, A/CW.2 Miss A. R. Simpson, Cpl Miss D. F. Smith, A/CW.2 Miss J. Standeven, A/CW.1 Miss J. C. Stiles, A/CW.1 Miss P. R. Tully, A/CW.1 Miss J. J. Watkins.

F/O. Mrs. V. E. Compton relinquishes her appointment (August 26).

Errata.

In the *Gazette* of August 6. Notification concerning Sgt. Gibbs, *for* 884 *read* 844.

In the *Gazette* of August 13. Notification concerning A/CW.2 Walkden, *for* May *read* Marion.

THE INDUSTRY

Rolls-Royce Figures

THE annual report of Rolls Royce Limited shows a net profit for the year of £464,263, to which is added for distribution £95,708, brought forward from the previous account. An interim dividend of 5 per cent. has already absorbed £56,616. It is recommended that a final dividend of 15 per cent., less tax will be made, and the sum of £169,847 has been allotted for this purpose. Reserve for Income Tax receives £265,000 and £68,508 is carried forward to the next period.

Spectroscope Analysis

WILD-BARFIELD Electric Furnaces, Ltd., have been appointed by the manufacturers of the Spekker Steeloscope, Messrs. Adam Hilger, Ltd., of London, to be distributors of this instrument in the United Kingdom. This small discerning instrument marks a stride forward in bringing spectroscopic analysis within the reach of most engineering firms. In its simplest form it can be used for the immediate check and sorting of incoming steels from suppliers, or for identification of steels in stores, which, even in the most carefully organised systems sometimes get mixed. With the Insta eyepiece, at slightly extra cost, it is a valuable addition to any metallurgical laboratory for accurate visual quantitative analysis.

A number of firms have already installed the Spekker Steeloscope and others can see practical demonstrations arranged at Wild-Barfield Electric Furnace's new address, which is Elecfurn Works, Watford By-Pass, Watford, Herts.

Goodyear L.D.V.

A VOLUNTEER Home Guard defence force made up entirely of employees of the Goodyear Tyre and Rubber Company has been established and their chief duties will be the defence of the tyre factory. A number of the company's employees have come forward to take their place in this vital work of protection, and they include many men who fought in the last war.

Ex officers have been selected to command and train the volunteers, who are developing into a strong and efficient force well able to take the proper measures against enemy action.